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Contents.

	PAGE
Forthcoming Events	283
Committee Control	283
A New Departure	283
Institute of British Foundrymen	284
Middlesbrough Convention Fund	284
Contracts Open	284
Random Shots	284
The Qualcast Foundry	285
Scottish Branch of the Institute of British Foundrymen	288
Smokeless Fuel	288
Foundry Training Abroad	289
Brazilian Iron and Steel Industry	290
Physical Chemistry of Steel-Making	290
Book Review	290
Iron and Steel Output in March	290
Steel Castings	291
Determination of Gases in Metals, Particularly of Oxygen in Iron and Steel	292
The Institute of British Foundrymen	293
Wales and Monmouth Branch of the Institute of British Foundrymen	296
Trade Talk	298
New Companies	298
Personal	298
Reports and Dividends	298
Company Meetings	298
Iron and Steel Markets	300
Falkirk and Australian Tariffs	300
Buenos Aires Exhibition	300

THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.

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Telephone: Central 1885. Telegrams: CIRA.
The B.C.I.R.A. Scottish Laboratories are:—
Foundry Technical Institute, Meek's Road, Falkirk *(Telephone 332).*

Forthcoming Events.

MAY 1-2.

Iron and Steel Institute:—Annual meeting at the Institution of Civil Engineers, London.

MAY 7.

Institute of Metals:—General meeting at the Institution of Mechanical Engineers, London. Annual May lecture by Major F. A. Freeth, O.B.E., F.R.S., D.Sc., on "The Influence of Technique on Research."

Institute of British Foundrymen.

APRIL 24.

London Section:—Annual general meeting in London.

APRIL 26.

Newcastle and District Branch:—Annual general meeting at Newcastle-upon-Tyne.

West Riding of Yorkshire Branch:—Annual general meeting at Bradford.

Lancashire Branch (Junior Section):—Annual general meeting, Manchester. "Jobbing Moulding," Paper by A. Sutcliffe.

Committee Control.

Considerable interest attaches to recent remarks of Sir Henry Thornton, a man who has earned the respect of all industrialists. Beginning his working life as a draughtsman, he made his way to the managership of an American railway, and was then brought over to manage the Great Eastern Railway in this country. In 1922 he went to Canada as chief of the Canadian National system, and having produced out of chaos a profitable and efficient organisation, he has earned the right to command an audience for his views on industrial matters. Not unnaturally he believes in administering his concern in his own way, without interference, and not unnaturally, also, he finds that he can only get his results by so doing. The greater part of his statement above referred to related to the question of committee management in industry, and it contained a very real lesson for many industries in this country, quite apart from the railways which are Sir Henry's special concern. The growth of big industrial units by a process of amalgamation has made a number of posts too onerous and responsible for one man, and the individual is, therefore, frequently reinforced by a committee of departmental chiefs acting in an advisory capacity. Sometimes, also, a particular officer is supervised by a committee or a group of directors. For such methods our authority has no use whatever. He says:—"That enterprise succeeds best which employs able, aggressive and progressive officers, and then leaves them severely alone so long as the results are satisfactory." He alleges, further, that supervision by directors extending to matters of detail encourages inefficiency, insubordination and disloyalty, since junior officers, who owe their allegiance to their chief, look beyond him for the approval or disapproval of the self-constituted and largely independent committees. The line of division suggested is that of leaving strategy to the directors and tactics to the administrator. If the administrator is unable to bear the burden of the position, the fault lies not with the position but with him. In other words, if the position is too big for the man, then it is necessary to find a bigger man. There is nothing but weakness in the policy of dividing a big job among small men or buttressing up a small man with committees to share and partition his responsibility. And if there be food for misgiving in the periodic complaints of an inadequate supply of "big men" in this country, it is worth remembering two things: one is that in a matter of this kind the demand usually creates the supply; and the other is, that the bigger the industrial units become the fewer will they be in number, so that the bigger the man required the less often will the need arise. The one-man business may be of the past, but one-man control is very much of the present.

A New Departure.

The Institute of British Foundrymen at its Council meeting last Saturday took action in an entirely new direction—that of creating a technical advisory committee. This committee is to sponsor the formation of numerous sub-committees to cover many activities of a technical character. As the resolution for its formation was unanimous and enthusiastically received, we do not feel that we are betraying any confidence in making this preliminary announcement—rather do we feel that it is the wish of the Council that the potentialities should be ventilated *ab initio*.

It is obvious that amongst the 2,000 members of the Institute there are large numbers of specialists in every branch of foundry activity.

Modern metallurgical thought is represented in the membership by the professors of the metallurgical departments of the Universities, supplemented by about a dozen doctors of science, metallurgy and philosophy; foundry transport by practically every manufacturer of handling plant; whilst experts in sand utilisation, welding, melting practice and patternmaking abound. Experts on malleable, non-ferrous and steel-foundry practice merely need assembling into committees, when decisions could be taken on standard practice and advice tended to related bodies. That such committees are a vital necessity was shown at last Saturday's meeting, when another national body required advice on standard colours for patterns. Representatives were chosen in whom the Institute has the greatest confidence, but if a committee had been in operation for some time, these delegates would be in a better position to represent the industry as a whole. We are certain that the British Cast Iron Research Association will welcome the innovation, as they will be able very accurately to interpret the wishes of the industry.

In order that these sub-committees may work well, much of the work will have to be done by correspondence, as is the case with the American Foundrymen's Association. An outcome of this effort, if successful, will be a more ordered and systematic presentation of Papers, both at the branches and the annual conferences.

Finally, we congratulate the Institute on their enlightened action.

XUM

Institute of British Foundrymen.

ANNUAL MEETING OF THE LANCASHIRE BRANCH.

The annual meeting of the Lancashire Branch of the Institute of British Foundrymen was held on April 2 at the Manchester College of Technology. The statement of accounts for the year showed that the payments for branch expenses amounted to £94 14s. 6d., and the remittances from the General Office were £118 19s. 4d. On January 1 the bank balance and the cash in hand amounted to £21 8s. 9½d.; on December 31 they had been increased to £45 19s. 0½d.

The report of the secretary (Mr. H. Stead) stated that during the year the lapses from membership were 35, made up of 15 full members, 15 associate members, 2 associates and 3 subscribing firms; the additions were 7 full members, 16 associate members and 1 associate. The number now on the register as subscribing members was 323. To some extent the drop in membership was attributable to the continued depression in trade. The outstanding feature of the year's activities was the visit of delegates from kindred foreign societies, the majority being American, for whom a very full programme was prepared by the Council.

The statement of accounts and the secretary's report were passed unanimously. On the motion of Mr. J. S. G. Primrose, a vote of thanks to the retiring officers was passed.

The election of officers for 1930-31 resulted as follows:—

Branch-President, R. W. Stubbs. Senior Vice-President, E. Flower. Junior Vice-President, A. Phillips. Council: Messrs. T. Beech, W. Dudley, H. Stead, A. Sutcliffe. Representatives to the General Council: Messrs. J. Hogg, C. W. Kent, E. Longden, J. Masters, R. A. Miles, J. S. G. Primrose. Auditors: W. Holland, A. Hopwood. Hon. Secretary and Treasurer, W. Gilpin. Assistant Hon. Secretary, C. F. Brereton.

Mr. Stubbs thanked the members for electing him Branch-President. He said he knew it would be difficult to rise to the standard established by his predecessors, but if he failed to do so the cause would not be lack of trying. He hoped during his term of office the Branch would improve its position in regard to membership and in other ways. He regretted Mr. Stead felt himself obliged by pressure of business to retire from the secretaryship, but it was a pleasure to know he would have Mr. Gilpin working with him.

A vote of thanks to Mr. Stead for his services as secretary was moved by Mr. Gilpin, seconded by Mr. Flower, and carried unanimously.

Mr. Flower moved a resolution to the effect that an annual levy of 1s. per member be made and the money so raised applied in furtherance of the social activities of the Branch. He said the Council generally thought more ought to be done in that direction, but the rules restrained them from allocating any part of the subscription for that purpose. He wanted the levy to be compulsory.

Several members approved the idea, but doubts were expressed whether there was power to make a compulsory levy. Mr. Flower amended his resolution so as to make it clear the contribution would be voluntary. It was then passed unanimously.

Mr. H. Milner read a Paper entitled "Some Aspects of Foundry Service to Engineers," in which he collaborated with Mr. E. J. L. Howard.

Mr. William Jolley, superintendent of foundries, patternshops, etc., of the Metropolitan-Vickers Electrical Company, Limited, Manchester, is leaving shortly for an extended stay in Leningrad, which he is visiting at the request of the Russian Government for the purpose of advising on the reorganisation of foundries. Mr. Jolley is a member of the Councils of the Institute of British Foundrymen and the British Cast Iron Research Association.

Middlesbrough Convention Fund.

Mr. F. A. Harper, Station Chambers, Middlesbrough, who is acting as the honorary convention secretary, has sent us the following list of subscriptions so far received. As further donations are received they will be acknowledged through our columns. They should be sent to Mr. Harper.

	£	s.	d.
Dorman, Long & Co., Ltd.	25	0	0
W. Shaw & Co., Ltd.	25	0	0
August's Muffle Furnaces, Ltd. ...	10	10	0
Fordath Engineering Co., Ltd. ...	10	10	0
British Chilled Roll Eng. Co., Ltd. ...	10	0	0
Wm. Cumming & Co., Ltd.	10	0	0
Head, Wrightson & Co., Ltd.	10	0	0
The Foundry Trade Journal... ...	5	5	0
J. W. Jackman & Co., Ltd.	5	5	0
Power Gas Corporation Co., Ltd. ...	5	5	0
J. & R. Ritchie, Ltd.	5	5	0
Tees Side Bridge & Eng. Co., Ltd. ...	5	5	0
J. C. Waterhouse, Ltd....	5	5	0
Whessoe Foundry & Eng. Co., Ltd....	5	0	0
Stephens Silica Brick Co., Ltd. ...	3	3	0
Thos. Wilkinson & Co., Ltd.	3	3	0
Jas. Brown & Sons, Ltd.	2	2	0
Jarvis Bros., Ltd.	2	2	0
Chas. P. Kinnell & Co., Ltd.	2	2	0
Pneulec, Ltd.	2	2	0
Ridley, Shaw & Co.	2	2	0
I. Robson & Co., Ltd.	2	2	0
W. Spencer & Co., Ltd.	2	2	0
John G. Stein & Co., Ltd.	2	2	0
Strakers & Love, Ltd....	2	2	0
Thos. Summerson & Sons, Ltd. ...	2	2	0
United Carborundum & Electric Works, Ltd.	2	2	0
United Molasses Co., Ltd.	2	2	0
Luke & Spencer, Ltd.	2	0	0
Penton Publishing Co., Ltd.	2	0	0
Thos. Allan & Sons, Ltd.	1	1	0
Armstrong Oiler Co., Ltd.	1	1	0
A. T. Green & Sons	1	1	0
Mr. F. A. Harper	1	1	0
Moss & Gamble Bros., Ltd.	1	1	0
Oughtibridge Silica Firebrick Co., Ltd.	1	1	0
Papermakers Chemicals, Ltd.	1	1	0
Parson, Crosland & Co., Ltd.	1	1	0
Mr. T. A. E. Samuelson...	1	1	0
Mr. W. H. Crosthwaite	1	0	0
Mr. A. G. Harrison	0	10	6
	£183	19	6

Contracts Open.

Biggleswade, May 5.—6,500 yds. of cast-iron pipes, etc., for the Biggleswade Water Board. Sir A. Binnie, Son & Deacon, Artillery House, Artillery Row, Westminster, S.W.1. (Fee £5, returnable.)

Cairo, May 20.—Pumping machinery, etc., for the Egyptian Ministry of the Interior. The Department of Overseas Trade. (Reference A.X. 9,395.)

Devizes, May 15.—Pumping plant, for the Devizes Town Council. Mr. C. G. Barrett, gas and water engineer, Northgate Street, Devizes. (Fee £3 3s., returnable.)

Devizes, May 15.—2,200 yds. of 9-in. rising main, for the Town Council. Mr. C. G. Barrett, gas and water engineer, Northgate Street, Devizes. (Fee £3 3s., returnable.)

Dublin, April 16.—60 tons of Mersey Dock section steel tramway rails, 126 lbs. per yd., etc., for the Dublin Port and Docks Board. The Engineer's Office, East Wall, Dublin.

Dundee, May 10.—Water pumps, for the Corporation. Mr. D. H. Bishop, general manager and engineer, Dudhope Crescent, Dundee. (Fee £2 2s., returnable.)

Edinburgh, April 23.—1,290 tons of cast-iron pipes, or alternatively 7,200 ft. of bitumen-lined steel piping, for the Corporation. Messrs. J. & A. Leslie & Reid, 29, Waterloo Place, Edinburgh.

Simla.—Four centrifugal pumps, etc., for the Indian Stores Department. The Department of Overseas Trade. (Reference A.X. 9,416.)

Random Shots.

The reviewing of books, save for a limited range of technical literature, does not come within the province of The Foundry Trade Journal, nor yet within that of "Marksman." Nevertheless, I am going to tell you a little about Francis Everton's new thriller, "Murder at Plenders," published, like its predecessors, by Collins. I am not doing this because Mr. Everton—under another name—is a well-known founder: were I to do so, I might be inundated with review copies of the works of innumerable founders with hitherto unsuspected literary aspirations! But I think you would enjoy the story, which has an authentic industrial flavour, and whose characters have a refreshing, if slightly crude, vigour of their own. Nor is too much licence taken in the matter of technicalities: if the climax, which I will not divulge, is just a shade improbable, the development of an anti-erosive steel alloy for use in gas turbines runs smoothly enough.

* * *

There is, however, one criticism that I have to make, and I am not sure whether the culprit is the author or the publisher. Mr. Everton's characters express a good deal of mistrust of scientific workers in general and scientific institutions in particular, but Mr. Everton himself is the soul of discretion, locating his "British Physical Laboratory" at Hendon and resisting any temptation in the way of portraiture. It seems, therefore, more than a pity that the synopsis printed on the dust-jacket and in the front of the book should refer to "the theft from the National Physical Laboratory," etc. As the same synopsis refers to the stolen "papers and the use made of them by George Annesley . . . who . . . keeps watch over . . . John Corrie," and the story concerns the efforts of George Annesley to discover the stolen papers, and his watch over Bernard Corrie, the conscientious reader will not attach too much importance to the error. But carelessness of this kind is a stumbling-block even to a good yarn—and "Murder at Plenders" is a good yarn.

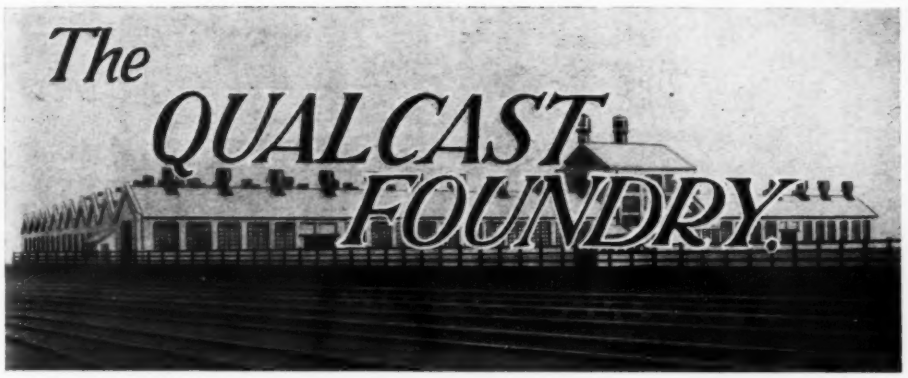
* * *

I must make my little contribution to the question of working conditions at home and abroad, and it relates to working hours in Germany. An inquiry undertaken in February, covering 63,500 undertakings and 2,700,000 workers, showed that only 17.2 per cent. were working more than 48 hours a week, either regularly or owing to temporary pressure, and of these 8.1 per cent. were working 48 to 51 hours, 7.1 per cent. were working 51 to 54 hours, and 2.0 were working over 54 hours. It is also stated, however, that the local variations in working hours were considerable, and in particular more than half the metal-workers in Rhenish Westphalia were found to be working more than 48 hours a week. These figures would suggest that the popular belief in long working hours in Germany is a somewhat rash generalisation from local conditions.

* * *

A good yarn of the political meeting species comes from South Africa, where General Hertzog, the Nationalist leader, was annoyed by a persistent heckler. "I suppose," he asked the man, "you are a member of the South African Party?" The man said he was. "Why?" "Because my father was before me." "Then what," said Hertzog, "would you have been if your father had been a baboon?" "A Nationalist," was the answer.

Marksman.



We are never impressed if we notice over a little cobbler's shop in a back street, "Established in 1801," but when, as in the case of Qualcast, Limited, this period of industrial exploitation has resulted in a modern, well-laid-out works associated with an intelligent and progressive management, we pay our respectful homage.

The new works, which are situated in the outskirts of Derby on a branch line of the L.M.S., are shown in the title block, and the foundry lay-out is detailed in Fig. 3. The new works were put into commission on October 1 last year; previously they were situated in the town of Derby.

Qualcast manufacture lawn mowers and precision castings of the highest grade and employ about 450 employees. At the time of our visit a well-equipped canteen for their use was approaching completion. This will be run on a co-operative system, involving the fixing of price-list for food, until a capital sum of, say, £200 has been reached, then prices will be reduced, so that revenue and expenditure just balance. In front of the canteen a bowling green is being laid out.

Commercial Organisation.

There are several details of the commercial organisation which are worthy of emulation by other foundries. Primarily, in the board room and offices of the executives black-boards have been installed, so that round-table discussions can take place on the ways and means of economically manufacturing castings and commercial engineers can illustrate their points.

The offices are housed in a bay of the works, and the corridor outside the individual offices of the executives is lined with photographs of the staff, the Dominion and foreign representatives, and the honours their products have won at various Exhibitions.

There are installed throughout the works, which are divided into two main sections, thirty-five telephones, all connected with the Post Office lines. Then there are prominently displayed numerous three-coloured lamps giving seven combinations. When an executive officer is required on the telephone Klaxon horns are sounded to draw attention to the lights, which indicate the person required, who, no matter where he be, can answer the 'phone with a maximum delay of 30 seconds.

Time Studies.

No phase of modern industrial activity is more instructive, money-making, and at the same time dangerous than time studies. Mr. V. Jobson, the managing director of Qualcast, Limited, was a pioneer worker in this branch. Up to date, some 60,000 separate studies have been made and a confidence established in its effectiveness. In spite of this, Mr. Jobson still insists that, like so many other activities, it is subject to the precepts of the adage "What is one man's meat is another man's poison." The procedure on receipt of a new pattern is as follows:—Primarily the tools, including the moulding machine, and incidentals such as a pattern brush, are listed, to be incorporated with other information on an Instruction Card. This "other information" comprises (*a*) a description of the job and the moulding boxes to be used; (*b*) a table detailing the various operations by number and description, the number of seconds occupied and a reference number to a previous study; and (*c*) totals and details for fixing piecework prices and bonuses. As an instance, operations numbered 12 to 14 on a certain job read "No. 12—dust parting cope; No. 13—sieve facing sand on cope using ¼-in. sieve; No. 14—tuck ingates of runner." The necessary times for each of these operations is as well known to the management as common atomic weights are to a chemist. For instance, it takes 6.1 seconds to put an iron frame in a drag, providing, and here is the cardinal point of the whole system, the frame is placed handily.

Details of the Foundry Buildings.

The foundry proper covers an area of 380 × 160 ft., divided into six bays. It is a modern light construction, having a serrated roof carrying northern lights and exceedingly well ventilated by Robertson's patent natural-draft system. It is heated by an overhead low-pressure steam system, which can be cut off in sections. When heating is no longer necessary, the stoker is transferred to window cleaning, and, in this connection, it is interesting to learn that provision has been made for a water supply to be available on the roof. That the ventilation is satisfactory is shown by the fact that after two hours' continuous casting there was only a slight haze in the building.

Fig. 1.—General View in the Foundry. Messrs. Qualcast, Limited.

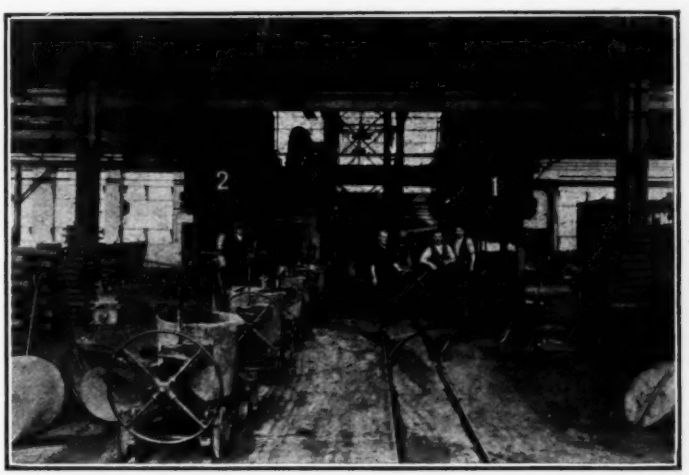


Fig. 2.—Showing the Cupolas and Type of Ladle used for distributing the Metal. Messrs. Qualcast, Limited.

Transport.

Main-line gauge runs both inside and outside the foundry on the cupola side. Internally, the system is to move from the sand department and core shop at the left-hand end of the foundry to the fettling, finishing and despatch departments at the opposite end. The metal is taken by ladle cars across the foundry and along its length by high-speed cranes of 1 ton capacity to stations where hand-shanks are filled. A night gang is employed for clearing up the shop.

Melting Plant.

Two 12-ton-per-hour Titan cupolas, carrying the Poumay system of melting, have been installed in such a manner that they can be blown by either set of Keith-Blackman fans, the change-over being but a matter of a minute or so. The charges are raised by hoist to a covered-in staging of generous proportions. Specially-designed bogie wagons are wheeled right up to the charging hole of the cupola, and fed in by hand, as the management attribute considerable importance to even distribution. A feature which we noticed is one which ought to be intro-

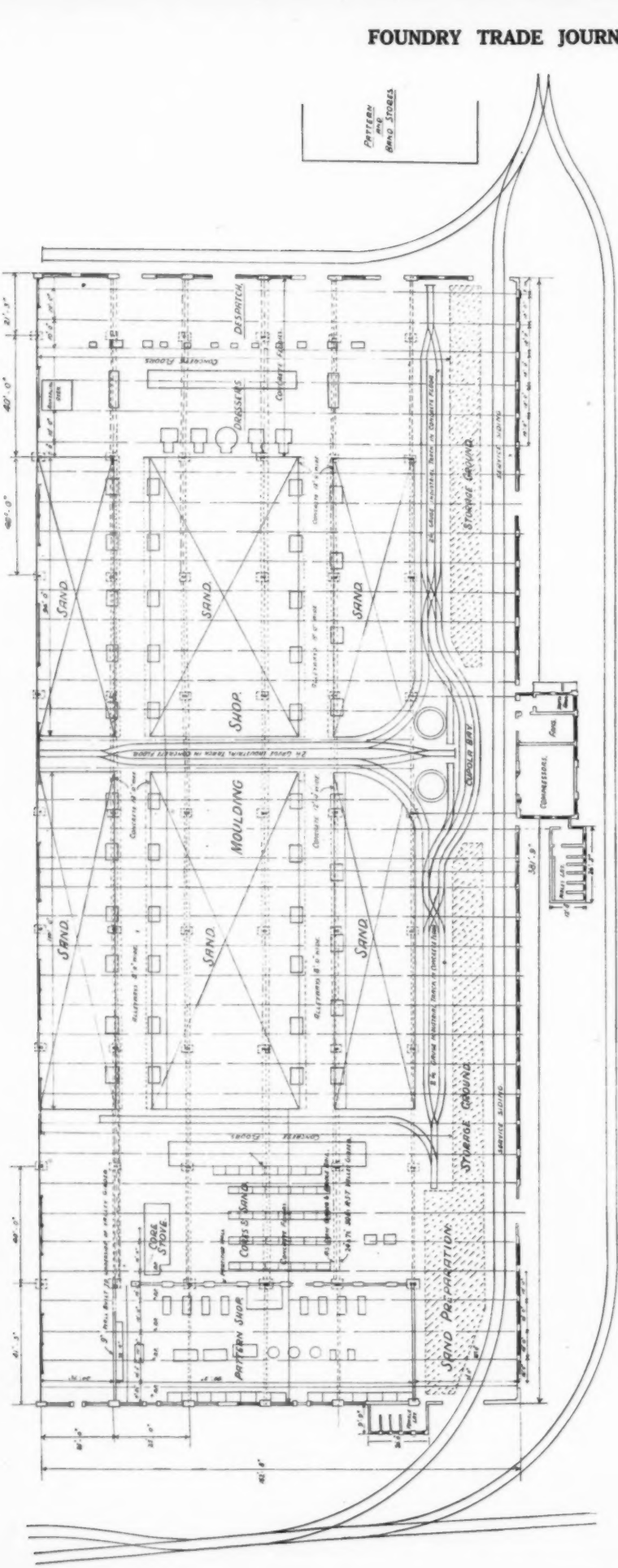


Fig. 3.—The General Lay-Out of the Foundry. Messrs. Qualcast, Limited, Derby.

duced into every iron foundry. The men patching the idle cupola were provided with electric light and protected from accident through falling material by means of a circular plate hinged across its diameter to permit of insertion through the charging door and resting on a bar fixed between a socket inserted in the back wall and the sill. The prop supporting the cupola bottom is removed by means of the crane and a snatch block.

Sand Preparation.

For the preparation of the facing sand, a Simpson intensified mixer has been installed. It is automatically fed with new sand, coal dust and old sand in predetermined quantities, four mixtures covering their requirements. The old sand is passed through a riddle and conveyed up a height, where it is passed through a rotary sieve, aerated and delivered ready for charging into the Simpson mixer. Special bogies, which are easily transported by crane and tipped, are used for feeding the moulding machines.

The backing sand is prepared by the night gang, using four Rover machines. The core sand, a mixture of linseed oil and Southport sand, is prepared in a Baker-Perkins paddle mixer.

Moulding Plant.

There are over 100 moulding machines installed, prominent amongst which we noticed the Britannia, Pridmore, Farwell, Jackman hand-squeezer and Adaptable, whilst for coremaking there are two Tabors, four Adaptables, and a Demmler. This last machine, which is a recent installation, blows the sand-mixture into the corebox. A difficulty with this machine which requires a little adjustment is the inability to use a parting-powder on the box as it is blown off. However, this is a little matter quite capable of being solved. The cores are dried in a battery of six August stoves using forced draft and are transported from the core-makers' benches to the stoves on racks which just fill each oven. An elevating truck serves the whole floor and to load and unload the ovens. After baking the cores, racks are placed behind the core inspectors and the finished cores are delivered to the moulding shop over a counter.

Patternmaking Shop.

The patternmaking is housed in a totally-enclosed department at the back of the core-shop. It is particularly well equipped with planers, shapers, sandpapering machines, drills, lathes, tool sharpeners, and an engraving machine. Wherever permissible the trade-mark "Qualcast" is imprinted on every pattern, so

Fig. 10.—The General Office is light, airy, and essentially modern in Equipment.

that the firm's productions are an everlasting advertisement for their standard of quality.

The pattern stores is housed in a warmed, double-cased building reminiscent of the war hutment. It does, however, give a maximum of utilisable space.

Casting and Finishing.

The metal is received in a tilting basin, which feeds the ladles. These are mounted on bogies

(*Continued on page* 288.)

Fig. 4.—The Cupola Stage, showing the Special Bogies used for handling the Charges. Messrs. Qualcast, Limited.

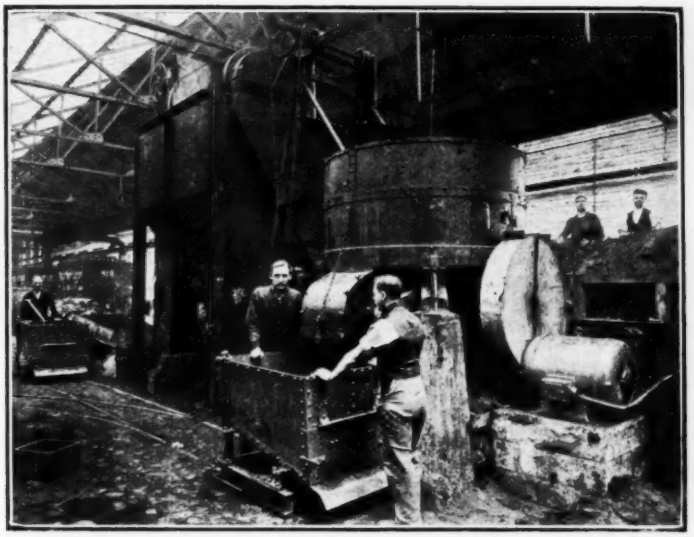


Fig. 5.—The Sand-Preparing Plant, showing the Special Containers used for transporting the Sand to the Moulding Stations.

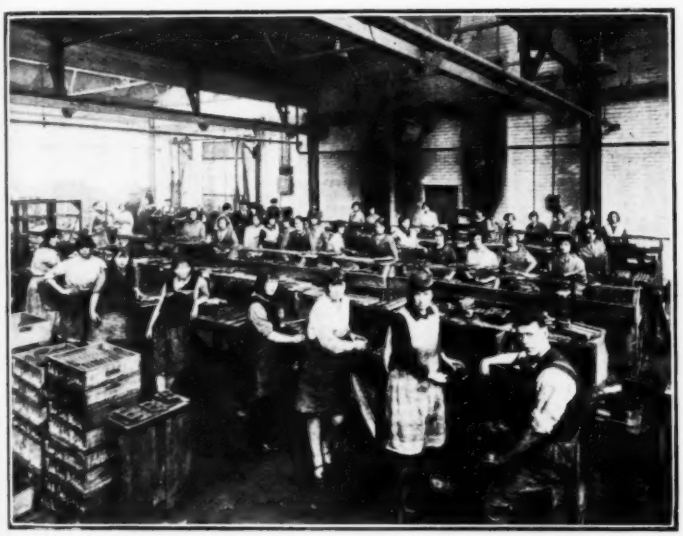


Fig. 6.—Cores are made by Girl Labour and delivered over the Counter to the Moulders. Messrs. Qualcast, Limited.

Fig. 7.—The Pattern Shop. Messrs. Qualcast, Limited.

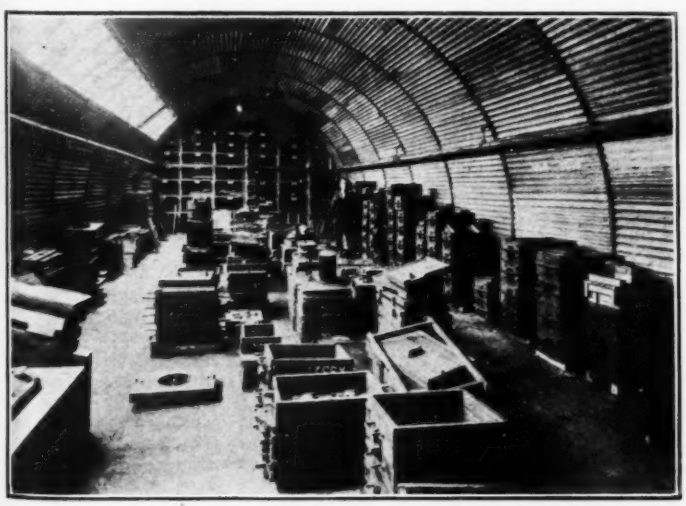


Fig. 8.—The Pattern Stores. Messrs. Qualcast, Limited.

Fig. 9.—The Fettling End of the Shop. The Night Gang fill the Tubs with Castings and have them ready for the Fettlers each morning.

XUM

Scottish Branch of the Institute of British Foundrymen.

ANNUAL BUSINESS MEETING.

The annual business meeting of the Scottish Branch of the Institute of British Foundrymen was held in Glasgow on March 22, with Mr. H. Winterton (Branch-President) presiding.

The annual report of the Council and the financial statement were read by the secretary, who pointed out that in all probability it was the most satisfactory report yet submitted to the branch. The membership, as shown, was a live membership owing to the policy of the Council of immediately removing the names of those in arrears for three years. He also pointed out that there had been a great improvement in the promptness of members paying subscriptions as soon as they became due, and for the current year nearly 70 per cent. of the members had already paid. The reports were approved on the motion of the Chairman.

Officers for next session were elected as follow:—

President: Mr. James Miller, foundry manager, Messrs. Babcock & Wilcox.

Senior Vice-President: Mr. James M'Arthur, Clyde Alloy Steel Company, Limited.

Junior Vice-President: Mr. N. M'Manus, M.B.E., Argus Foundry Company, Limited.

Members of Council: Messrs. Walter Bain, H. D. Campbell, Thomas Shanks and Robert MacNab.

Representatives to General Council: Messrs. Jas. Affleck, B.Sc., and J. W. Donaldson, D.Sc., A.I.C.

Mr. John Bell was re-elected hon. secretary.

On the motion of the President, a vote of thanks was accorded the Governors of the Royal Technical College for the use of the rooms without charge during the session.

Presentation of Diploma and Surtees Awards.

The Chairman said that they were fortunate in having with them Mr. Sam Mavor, managing director of Messrs. Mavor & Coulson, Limited, who had very kindly consented to present the Surtees medals and prizes and the Institute Diploma which was awarded to one of the members. He announced that the Governors had considered the examiners' report and made the following awards:—

Senior Grade.—Norman C. Blythe (Gold Medal); Robert MacNab and Thos. Davis (prizes).

Junior Grade.—David Webster (Silver Medal); John Darby and Isaac Wilson (prizes).

Mr. Sam. Mavor, having handed the medals and prizes to the recipients, and also the Institute Diploma to Mr. William McCulloch for his Paper on "Monel and other Non-Ferrous Castings," said that he regarded it a compliment and also a privilege to be allowed to distribute the medals, prizes and diploma. It was with much gratification that he noticed that at the last Surtees competition one of his apprentices won the silver medal, and on this occasion the gold medal had been won by one of his past apprentices. That naturally stimulated his interest in the competition. Mr. M'Grindle is now with the British Cast Iron Research Association in Birmingham, where the firm has arranged for him to spend two years at full pay. The arrangements of the Association for supplementing his wages has enabled him to spend that period in the laboratories of the B.C.I.R.A.

The foundry industry was for a long time backward and did not show the development that engineering had done. That was no longer true, and the change was in no small measure due to the Institute of British Foundrymen. The main value of the Institute was that it had been the means of bringing together what was once a large number of individuals working on their own lines, which might have been right or wrong. These individuals now formed one strong corporate body working for the good of the foundry industry. The Institute has many activities, and perhaps none more valuable and productive of profit than that of encouraging junior members of the industry. Competitions are invaluable as a means of training the juniors to express themselves. It was necessary that they should have the faculty of expressing their ideas clearly as well as formulating and carrying them out.

The increasing demands of engineering upon cast-iron and non-ferrous castings has led to vast improvements in the industry; he would mention the Diesel engine and the improvement it caused in foundry practice. The I.B.F. was instrumental in forming the British Cast Iron Research Association. That alone was an outstanding service to the industry, for the Association was of very great value to the foundry industry. Research should be compulsory in all industry if we were to hold our own in competition with other countries in the production of high-class goods. Severe competition was experienced from countries who could produce very cheaply goods of second or third quality. Mr. Mavor thought that if our higher-wages standard was to be maintained we must manufacture goods of a quality unapproached by other countries. As an example, at one time we were able to manufacture electrical goods in this country and to export large quantities of accessories. These accessories were now standardised and made by unskilled labour in other countries. In regard to the larger plant such as dynamos and motors, this country was steadily improving its position and there were fewer competitors. Research should aim at increasing quality. Foundry practice has greatly developed in recent years, and in the lighter work the machine shop has become an immensely important factor. The foundry is now gaining as the precision of engineering.

An important function of I.B.F. was the arranging of works visits in this and other countries. He had for many years been a member of a small group of firms who had an arrangement whereby they visited each others works. They usually met the evening before the visit, when a member of the firm to be visited opened a discussion on some subject with which he was quite familiar, and a description of what was to be seen in the works was given. The following day they were shown everything in the works, and those interested in a special department were free to spend their time in and examine that department. The previous week he had been in a foundry and saw something that was new to him, although it might be old to many, namely, the embedding of old chains in the sand for shaking out the boxes. A link was attached to the crane, and the job was very quickly performed. He was astonished to find that there were only three subscribing firm members, and he thought that that ought not to be, considering the large number of firms interested in foundry practice. Little could be done without publicity, and he suggested that the pamphlet and report be sent to every firm in Scotland, with a covering letter intimating that a representative of the Institute would call and discuss matters. If a motor-car would be of any assistance in that campaign, he would be glad to provide it. However, he promised that next week there would be at least one more member firm.

The Chairman thanked Mr. Mavor for his suggestions, but would also like to tell him that the pamphlet had already been sent to every foundry in Scotland.

Mr. N. M'Manus said that, on behalf of the Scottish Branch, he had pleasure in asking Mr. Mavor to accept their very best thanks for coming and distributing the prizes. There was no doubt that the winners would always come from those firms who took an interest in their apprentices. Mr. Blythe received his early training in Mr. Mavor's works. In the name of the members, he asked Mr. Mavor to accept their best thanks.

Mr. J. Affleck said that, as one of the governors responsible for the organisation and arrangement of the Surtees competition, which was held every two years, he considered it a great honour that Mr. Mavor, who had so prominent a place in what might be called the world of industrial psychology, should come and give the prizes. Industrial psychology dealt with youths, and it aimed at placing the lads into spheres for which they are best suited. As Mr. M'Manus had mentioned, the prizes almost invariably were won by boys in firms who took an interest in the apprentices, which indicated that such interest, even to payment of supervisors by the employers, was not wasted. He had much pleasure in seconding the vote of thanks.

Mr. Mavor said that it had been a great pleasure to meet the members of the Branch and to make a closer contact with them. He would be pleased if that contact could be still closer. If any small group of members cared to visit his firm's foundry, they were welcome. It was only a small foundry, but he thought that in the particular work they did they might be able to show something of interest.

The Qualcast Foundry.

(*Continued from page* 286.)

running on narrow-gauge lines, permitting of straight run across the foundry to the transfer stations. Here there are switches which allow the return of the ladle along a parallel set of lines. At the transfer station the ladle is taken from its carriage by one of the overhead cranes and deposited at the various teeming stations. The ladles are provided with legs and a tipping gear. The system is smooth-working, inexpensive and efficient.

The castings are knocked out by the night-gang and transferred to the fettling end in large wooden boxes mounted on wheels. Here they are dealt with by a series of grinders, sand-blast and ordinary tumbling barrels, rotary table machines and a cabinet.

Certain castings are heat-treated by packing in boxes with a mixture of limestone and coke breeze at 800 deg. C. to confer upon them the best possible machining properties. Through a well-equipped chemical laboratory a technical control is instituted on the raw materials used, the conduct of the furnace operation and the quality of the finished castings. In conclusion, we gratefully acknowledge the help we have received in the preparation of this article from Mr. V. Jobson, the managing director, and Mr. Bigg, the assistant managing director of Messrs. Qualcast, Limited.

Smokeless Fuel.

At a meeting of the Mining Institute, held in the Royal Technical College, Glasgow, Mr. W. J. Skilling, of the Fuel Research Board, in the course of a Paper on "Low-Temperature Carbonisation," said that the enormous development of the process of carbonising coal at a low temperature during the last ten years had behind it two main objects. The first, the replacement of the 40,000,000 tons of coal burned annually in open grates by a suitable smokeless fuel and so tend to clean the atmosphere and remove the smoke nuisance in large cities. The second object had behind it the attempt to develop a home source of liquid fuel to replace a portion of the petroleum oil.

Foundry Training Abroad.

By J. G. Pearce, M.Sc. and M. H. Pearce, M.A.

III.—France.

Condition of Foundry Training in France.

The conditions prevailing with regard to foundry education in France are already fairly well known in this country.* They are of a nature to lend themselves readily to description and they are sufficiently near at hand for personal acquaintance to be possible in many cases. It is not proposed, therefore, to do more than summarise in one ordered statement information that is already largely accessible in a variety of sources, and to recapitulate the more striking features in order to draw such conclusions as may be valuable in the present case.

Apprenticeship Schemes.

Of recent years efforts have been made to meet the requirements of the foundry trade in France, where skilled labour is concerned by the elaborate organisation of a nation-wide scheme, under the auspices of the French Foundry Employers' Association (Syndicat Générale des Fondeurs), which has laid down the general desiderata for apprenticeship schemes and has planned detailed courses for the requisite technical instruction. Some part of the impetus to this movement came from the difficulties of the post-war period, which France shared with other European countries. The scheme thus laid down is followed by a number of districts and individuals, the most successful of the districts being the Nord, Ardennes, Haute-Marne, Creusot, and the neighbourhood of Paris. Founders are encouraged to take apprentices, preferably between the ages of 13 and 16 years, in the proportion of 5 to 7 per cent. of the total of foundry labour employed; to select the boys carefully, to enter into a written agreement with their parents, and to pay them at least as much as the current rate of remuneration for non-apprenticed employées of the same age. In this connection various methods are adopted for getting in touch with the right lads, these methods being similar to those in use in this country, including works visits for schoolboys, information on the foundry trade, and co-operation with schoolmasters for the placing of boys. The apprenticeship covers a period of three years, the practical instruction being in the hands of a carefully-chosen skilled workman who acts as instructor, and whose selection must depend as much on his natural aptitude for teaching boys as on his craft skill. There are some instances of foundry-apprentice training provided by schools, notably at Tourcoing, Roubaix, and Lyons, but the men they turn out are as a rule better fitted for staff positions than for the purely operative grades. For purposes of technical instruction, the employers of a district sometimes share the instruction afforded by the local technical schools, but the majority of them prefer shop instruction. Additional evening courses are drawn up by the Foundry Employers' Association functioning through its regional groups. After a year's preliminary study the apprentices follow courses laid down to cover the following subjects: (*a*) The raw materials of the industry; the methods of melting and casting; the auxiliary processes; scientific control and elementary metallurgy; foundry lay-out and organisation; (*b*) dry- and green-sand moulding; casting practice and methods for both ferrous and non-ferrous metals, and the physical and chemical principles that underlie the process. At the end of these three years the apprentice becomes a qualified journeyman, but it is strongly recommended that before the qualification is considered complete each individual should have some experience of journeyman employment in a foundry other than the one in which he has served his apprenticeship. At the same time it is considered no less important that the apprenticeship itself be served in one foundry throughout.

The Foundry High School.

A second stage of technical training follows for those who desire to obtain access to the higher grades of the trade, and this consists of a year's instruction, generally given on Sundays, in such subjects as mathematics, physics, chemistry and drawing. The few who desire the highest qualification of all proceed to a third stage, which is definitely a preparatory course for admission to the Paris Foundry High School (Ecole Supérieure de Fonderie).

This school, whose reputation in this country is considerable, may be described as the apex of foundry training in France. It draws its students approximately in equal numbers from the class of apprentices just described and from the graduates of a number of recognised engineering schools throughout the country There are four important engineering schools in Paris, in addition to several others of a highly-specialised character, and there are local engineering schools at Nancy, at St. Etienne, in the North and elsewhere. In addition, there are the National Schools of Arts and Crafts (Ecoles Nationaux des Arts et Métiers), most of which are very much older than anything of the kind in this country, and which are located at Angers, Châlons and in Paris. The last-named especially provides a considerable number of the students who pass through the Foundry High School. Prior to the foundation of the Foundry High School, the training available for foundry executives in technical schools and colleges was of a general metallurgical character, and was not in direct relation to foundry needs, although a few lectures were sometimes devoted to the subject. An exception was to be found in the Schools of Arts and Crafts, which at one point provided a three-year course of seven hours' study per day, but this was reduced to a two-year course of five hours' study per day, and, subsequently, to one year. In general, the tendency in France was very similar to that observable in Germany and elsewhere, namely, to train mechanical engineers, with only the very slightest bias towards the foundry.

Candidates for admission to the Foundry High School, whether apprentices or graduates, must be between twenty and thirty years of age, and must have spent some time actually in the foundry before presenting themselves for admission. The specified period is eighteen months in the case of the apprentices, while in that of the engineering students it was originally six months, and is being gradually increased to two years, owing to the importance that experience has attached to such preliminary contact with industrial practice if the course is to be fully effective. There is an entrance examination, both on the practical and the theoretical side, the standard being such as to ensure that the students are capable of profiting by the instruction offered. In addition to the regular students of the school, admitted in strict accordance with these conditions, there are a certain number of non-diploma students (auditeurs libres) and of foreign students, with regard to whose admission slightly greater latitude exists. An undoubted minor advantage of throwing open the doors of such a school to foreign students lies in the fact that such students will return to their own countries accustomed to French methods and French equipment, and there will be a corresponding effect on the market for such equipment in the country concerned. Although the school has only been in existence since 1924, its international reputation is already such that students have come from Armenia (1), Belgium (2), Czecho-Slovakia (3), Italy (2), Japan (1), Norway (1), Spain (4) and Switzerland (3), while the total number of students from 1924 to 1928 was 83 regular and 27 non-diploma. (These figures include the foreign students already mentioned.) The fact that there have as yet been no British students of either class may be due in part to the poverty of our language teaching. Students from the various countries named would rarely find any difficulty in following courses in French, but it would be a different matter for the average young English foundryman, or even for the average young English graduate. In this connection it is interesting to note that twelve students have been from time to time sent by the works or company employing them, these students usually being foremen or foundry managers.

Organisation of the Foundry High School.

The school is financed jointly by the Foundry Employers' Association and the Department of Technical Education, the students paying suitable fees, and the course is concentrated into the seven months January-July, the working hours being 8.30 to 12 and 2 to 6. The school has its own accommodation on the premises of the Paris School of Arts and Crafts. The instruction is comprehensive, including both the practical technique of the profession and the scientific subjects that are concerned in it. Works visits are made once or twice a week, each student taking his turn in reporting such visits, and a week's study-journey is arranged during the Easter vacation. The final qualification depends upon three conditions. The first is the general standard of the work done by the student during the course. The second is a final practical test which consists of taking an actual blue-print or casting and preparing complete sketches of the pattern, the method of moulding and coring, gating and running, with a description of the method of production and the equipment required, according to the size and output; a statement is also required of the charges necessary and their composition, the delivery and cost of the job—that is to say, the student must treat the casting as a production job and give full information from beginning to end. The subject set in 1928, for example, was a locomotive superheater. The third condition is a thesis that must be submitted by the student after a period of six months engaged in practical foundry work subsequent to the completion of the course, and which is regarded as a test of capacity to undertake and pursue individual work. A number of these studies have from time to time appeared in appropriate technical journals. The diploma that is awarded is that of Foundry Engineer (Ing. E.S.F.), and it is necessary to remember that in the French foundry the foundry engineer so-called holds a position similar to that of the German foundry engineer to whom reference has already been made. Available records of past students of the Foundry High School show that the greater number are engaged in foundry management in large plants.

The Advantages of the Foundry High School.

The Paris Foundry High School has a number of features that demand attention. The first is its position as an establishment for highly-specialised vocational training jointly financed by the Government and the industry, the former functioning through the Department of Technical Education (Sous-Secrétariat d'Etat de l'Enseignement Publique) and the latter through the Foundry Employers' Association. The second feature is the instruction side by side of young men drawn from the industry and young men drawn from the engineering schools. No one who has any acquaintance with the working of a system that brings together these two classes will deny the immense value of this arrangement, the two types of students filling out the gaps in each other's mental equipment and rubbing off

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* See "Foundry and Engineering Training on the Continent," by Vincent Delport, Ing. E.P.C., FOUNDRY TRADE JOURNAL, October 16, 1928, page 276.

each other's corners, besides forming the habit of a co-operation that must be a highly progressive factor in the industry. Thirdly, the Foundry High School has the very real merits of a works school, in that it has only a very small staff occupied exclusively with teaching, and a very large staff, if staff it may be called, of specialists who come to give instruction in their own speciality only—eminent metallurgists like M. A. Portevin and M. Chevenard, on the one hand, and, on the other hand, such practical foundrymen as M. Ramas and M. E. Ronceray, the latter being actually director of the school. This, of course, involves a certain amount of difficulty on account of the necessarily somewhat unco-ordinated nature of the courses, but to the intelligent student the inevitable discrepancies must be stimulating rather than troublesome. Fourthly, the student of the Foundry High School is taught the whole process of making a casting as a business proposition, from the reading of the blue print to the testing of the finished product. Not only can he make a casting, but he knows—or he should know—the why and the wherefore of every step in the process.

Conclusions.

A comparison between the Paris Foundry High School and the Aachen Technical High School suggests itself at once. The French school gives a very much shorter course—seven months as against four years—but this is possible because its aim is to train good foundrymen, assuming a broad scientific education as a foundation. On the other hand, it must be remembered that the students of the French school are as a rule older than those of the German school, and those of them who are anxious for a general scientific education will have obtained it at one of the engineering schools before applying for admission to the Foundry High School.

Foundry education in France deserves very careful study in this country. In the first place, it is being developed on lines that are practical and acceptable to the industry, and that incorporates the various and sporadic efforts made in the same direction by isolated individuals. In the second place, it covers both the ordinary requirements of the average apprentice and the special requirements of the unusually capable or ambitious. In the third place, it offers in the Paris Foundry High School an extremely interesting example of an institution specifically for foundry training.

Brazilian Iron and Steel Industry.

In its bi-monthy report upon "Business Conditions in Latin America and the West Indies," the Royal Bank of Canada states that further development of the iron and steel industry in Brazil is considered highly possible. Ore deposits in the State of Minas Geraes are estimated in billions of tons; much of the ore is high-grade, and the greater part is concentrated about 300 miles from the coast. The Itabira Iron Ore Company has been granted a concession in this State, and final approval of their plans is anticipated for early in 1930. They agree to construct within two years a 150,000-ton metallurgical plant with a blast furnace of 500 tons daily capacity, and a secondary plant for the conversion of iron to steel. The important drawback to previous exploitations will be removed by their plan to build a railway to Itabira. They propose to import coal and to export part of the ore. Iron and steel products are now being manufactured in the State of Sao Paulo, and are of types such as stoves, safes and smaller hardware.

Sir John Reeve Brooke has been appointed vice-chairman of the Electricity Commission in succession to Sir Harry Haward, who retired from that position on March 31.

Physical Chemistry of Steel-Making.

DEOXIDATION WITH SILICON IN THE BASIC OPEN-HEARTH PROCESS.

According to Messrs. C. H. Herty, Jr. (Physical Chemist, U.S. Bureau of Mines), and C. F. Christopher and R. W. Stewart (Research Engineers, Carnegie Institute of Technology, in Co-operative Bulletin No. 38 (Mining and Metallurgical Investigations), issued under the auspices of the U.S. Bureau of Mines, the Carnegie Institute of Technology, and Mining and Metallurgical Advisory Boards, the following conclusions may be drawn as the result of experimental work described in that bulletin:—

(1) If silicon alone is added to a bath of steel containing less than 0.10 per cent. manganese, the time required to clean the bath, as shown by tests taken from the furnace, will vary from 10 to 90 min., depending on the depth of bath, the amount of iron oxide present in the bath, the amount of silicon added, the iron oxide content of the slag, the viscosity of the slag, and the temperature.

(2) The rate of elimination of silicate particles is directly proportional to the average rate of rise of the particles first formed on deoxidation. Variations in the factors in conclusion (1) will either slow up or increase the net time for cleaning. For example, a heat with a very high iron-oxide content in the slag will clean up faster than a heat with a low iron-oxide content, all other conditions being the same.

(3) As a result of the long time required to clean the heat, the metal has a high content of FeO by the time the silicate particles have been eliminated, thus nullifying any good effects that the silicon addition may have had.

(4) A residual manganese of 0.19 per cent. has been found to speed up the elimination of silicates somewhat, due to the fluxing action of MnO dissolved in the bath.

(5) It is highly probable that an addition of manganese before the silicon addition would be helpful in cleaning the steel in reasonable time.

(6) The amount of silicates formed is proportional to the amount of iron oxide present in the steel. The type of silicates formed depend on the amount of iron oxide in the steel and the amount of silicon added.

(7) The amount of iron oxide dissolved in the metal has been found to be slightly greater than the saturation value as determined by the iron-oxide content of the slag and the temperature, unless the slag is very viscous, in which case the metal is below the saturation value in iron oxide due to the slow diffusion of iron oxide from slag to metal. The fact that the iron oxide was found to be higher than the saturation value is probably due to certain experimental errors discussed in the text.

(8) The experimental work has shown conclusively that there is a layer of silicates at the slag-metal surface which do not enter the slag unless an extremely long time is allowed for the re-boil. These silicates are thrown back into the metal when the heat is tapped and the result is dirty steel in the ladle. The shorter the time between the silicon addition and the tapping of the furnace the greater is the increase in silicate content of the metal from the time the bath appears to be clean, as shown by furnace tests and samples taken on the pouring platform.

(9) The equilibrium (or deoxidation) constant for the reaction

$$Si+2FeO \rightleftharpoons SiO_2+2Fe$$

has the value

$$K=(Si)\times(FeO)^2=1.65\times10^{-4}.$$

This is in excellent agreement with that found in previous work in the laboratory.

(10) The kick-back of phosphorus and manganese on the silicon addition was found to increase with increasing silicon content of the metal, but the phosphorus and manganese were eliminated a short time after the kick-back occurred. On steels higher in carbon the kick-back of phosphorus may be enough to make the steel too high in phosphorus to come within specifications, particularly if the heat is taken out immediately after the addition of silicon.

(11) The action of 10 per cent. silicon pig and 50 per cent. ferro-silicon have been compared, and it has been found that the chief difference is that ferro-silicon acts a little quicker than the silicon pig; but for experimental purposes either material is satisfactory.

(12) The elimination of silicates from the charge is assisted by high residual manganese.

(13) Ore added to the bath increases the silicate content of the bath temporarily if the slag is thin. If the slag is very thick, it acts as a shield and dissolves the ore or cinder, thereby absorbing the silicates in the ore. If the slag is thin, ore should not be added for about an hour before tapping the heat.

(14) The silicon addition has little or no effect on the cleaning of silicates from the charge, and has the decided disadvantage of the formation of a layer of silicates at the slag-metal surface, which reappear in the metal when the heat is tapped.

(15) The use of deoxidisers in the mould, on steel not killed in the ladle, increases the oxide content of the finished steel in proportion to the amount of deoxidiser used in mould.

(16) The hydrogen-reduction method for determining FeO in unkilled test-pieces gives low results, due to the evolution of gas during solidification of the metal in the test mould. The inclusion-count method is accurate for calculating the FeO dissolved in the bath just before the deoxidiser is added.

(17) The Dickenson method is of little value in determining the point at which a re-boiled heat becomes clean, because of the high solubility of high-manganese and high-iron silicates in the Dickenson reagents.

(18) A new method for determining the amounts of globular silicates in steel has been developed and is given in detail in the text.

Book Review.

Bibliographie der Elektro-Metallurgie des Technischen Eisens, compiled by Prof. Dr. Ing. E. Kothny. Published by the Verein Deutscher Giessereifachleute, 100, Friedrichstrasse, Berlin N.W.7. Price 6 R.M.

The application of the electric furnace to the fabrication of iron and steel has created a vast literature of its own, and this 66 page bibliography is a reasonably complete statement of all the available literature on the subject. The fact that the bibliography is in German detracts but little from its utility. The best feature of the book is that there is no bias towards German work, British, American, French, Italian and Swedish being equally well detailed. The only adverse comment we have to make is the number of printers' errors in the setting out of the list of authors—Harbord, Campbell, Faulkner, Cole-Estep, Deschamps—are all mutilated in some way. The two most striking omissions are the names of Greaves and Gilot.

Iron and Steel Output in March.

The National Federation of Iron and Steel Manufacturers report that the number of furnaces in blast at the end of March was 157, a decrease of 5 since the beginning of the month. The production of pig-iron last month amounted to 665,800 tons, as compared with 607,000 tons in February. The production included 204,200 tons of hematite, 266,400 tons of basic, 139,800 tons of foundry and 27,700 tons of forge iron. The March production of steel ingots and castings amounted to 826,100 tons, compared with 776,400 tons in February.

XUM

Steel Castings.

By T. M. Service.

(*Continued from page* 268.)

Superficial Contraction.

The third factor is superficial contraction. Every steel founder knows that steel contracts superficially during cooling, but the amount per lineal foot varies according to the type and form of casting. An exhaustive investigation of the contraction of steel during cooling, and the temperature at which hot tears occur, was carried out by Friedrich Korber and George Schitzkowski, and their results were published in

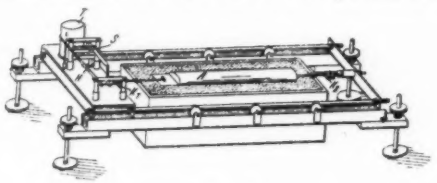


Fig. 12.

"Stahl und Eisen" on February 2 and 9, 1928, The following is taken from that report:—The contraction is obtained by means of an apparatus which records the movement of the cylindrical test bar cast in sand and during the cooling from the liquid to solid cold state. Fig. 12 illustrates

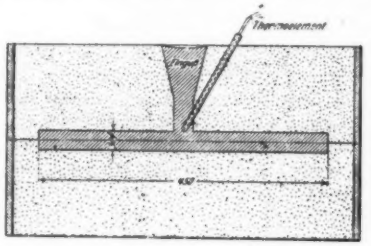


Fig. 13.

this apparatus, and Fig. 13 shows the bar with central feeding head and thermo-couple inserted in order to record temperatures during cooling.

Acid and basic steel was used for the investigations. Composition:—

	C.	Si.	Mn.	S.	P.
Acid	0.28 to 0.50	0.22 to 0.60	0.26 to 0.60	0.036 to 0.085	0.063 to 0.106
Basic	0.15 to 0.39	0.32 to 0.47	0.49 to 0.80	0.021 to 0.045	0.014 to 0.047

The bars were cast in both green sand and dry sand.

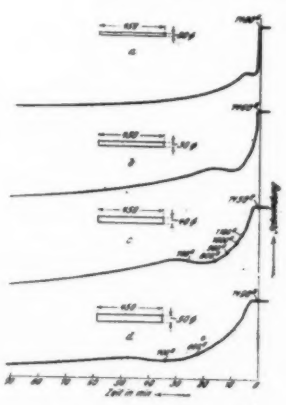


Fig. 14.

Table I shows an average contraction of 2.16 per cent.; the bars were not obstructed in any way during cooling.

Fig. 14.—Curves showing contraction.

Flanged Bars.—Bars 450 mm. total length, with a flange at each end 120 by 130 by 140 by 140 mm. dia. × 20 mm. thick, were cast in green sand and a duplicate series in composition, the composition being a mixture of fireclay, alumina and graphite, and dried. Bars with flanges as above, cast in green loose sand, showed approximately the same contraction as plain bars without flanges.

The behaviour of flanged bars cast in dry sand is shown in Tables II and III. In cooling from the fluid condition with acid an arrest was observed at 1,300 deg. C., and the curve runs horizontally for a short time, then continues to fall regularly until the usual arrest points are reached.

Fig. 15 shows a 30 mm. bar with flange at each end, which was cast in green sand, its contraction being obstructed. The distances between the ends of the bars and the flanges were

Fig. 15.

2, 4, 6, 8, 10 and 12 mm., these distances being filled with loose sand. The results obtained are shown in Fig. 16 and Table IV. From these results is shown that the amount of contraction can change if obstruction takes place above 700 deg. C. If the obstruction occurs immediately after solidification, and within a range down to 1,200 deg. C., hot tears may occur.

Figs. 17 and 18 show the results obtained by Dupuy by heating 0.15 per cent. and 0.44 per cent. steel respectively to a temperature of 1,250 deg C.; as seen at this temperature, the tensile strength is very low, being only a few kilograms per sq. mm. As a result of those experiments it is demonstrated that obstruction of contraction of a casting above 700 deg. C. changes the amount of contraction. If the resistance in the mould occurs immediately after solidification, and down from 1,350 deg. C. to 1,200 deg. C., at which temperature, as shown by Dupuy's work, steel possesses a very low tensile strength,

Table I.—*Shows Contraction of Acid Steel Bars Cast in Green Sand.*

Dia. of bar.	Total contraction.	Contraction above 700 deg. C.	Contraction below the Ar_1 point.	Casting temp.
mm.				deg. C.
20	2.20	1.19	1.01	1,480
30	2.18	1.21	0.97	1,460
40	2.13	1.06	1.07	1,450
50	2.16	1.20	0.96	1,490

Table II.—*Acid Steel Flanged Bars Cast in Dry Sand.*

Flanged bar.	Total contraction.	Above 700 deg. C.	Below 700 deg. C.	Casting temp.	Condition of bar.
mm.				deg. C.	
20	0.34	0.21	0.13	1,460	Cracked at flange
30	0.61	0.18	0.43	1,470	,, ,,
40	0.89	0.41	0.48	1,460	Cracked under head
50	1.78	0.89	0.89	1,490	,, ,,

Table III.—*Basic Steel Flanged Bars Cast in Dry Sand.*

Flanged bar.	Total contraction.	Above 700 deg. C.	Below 700 deg. C.	Casting temp.	Condition of bar.
mm.				deg. C.	
20	0.55	0.07	0.48	1,450	Cracked at flange
30	0.43	0.20	0.23	1,440	,, ,,
40	0.50	0.32	0.18	1,500	,, ,,
50	0.91	0.38	0.53	1,485	Cracked at head

a very small additional stress is sufficient to produce hot tears.

The work of Korber and Schitzkowski is valuable, as it agrees with experience. All steel founders know that tears do take place in castings at a high temperature, but this work fixes the temperature within limits of from 1,200 to 1,350 deg. C.

Table V is interesting, as it gives periods of time from casting to attaining temperature of 1,300 deg. C. for bars of varying diameters.

Tension Cracks.

Hot tears are due to excessive stress applied in the plastic range; on the other hand, tension

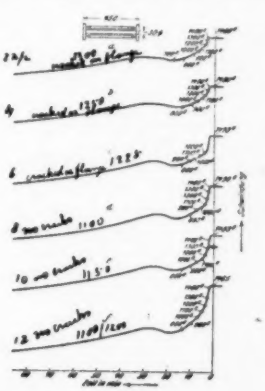


Fig. 16.

cracks occur through excessive stress in the elastic range. Tension cracks principally occur in castings which have a rapid change of section, or in complicated ones which are made in steel

which hardens readily. The cracking generally occurs after the casting has cooled down, say to a black heat 100 to 300 deg. C., or at ordinary temperatures, or when it sustains a shock such as is produced by hammering.

Dr. Hans Malzacher has studied this problem, and his results were published in "Stahl und Eisen" on December 15, 1927. He made a pattern 1,020 mm. dia., and from this he made two moulds and cast two cylinders:—

No. 1, 20 mm. wall thickness; and No. 2, 60 mm. wall thickness. No. 1 cylinder, after casting, had an internal diameter of 1,005 mm., whilst No. 2 cylinder, after casting, had an internal diameter of 1,000 mm. In the case of No. 1, the 20 mm. wall thickness only contracted 1.5 per cent., while in the case of No. 2 the 60 mm. wall thickness contracted 2 per cent. The remaining tension in each of these two cylinders should be uniformly distributed. Malzacher then combined the two cylinders, and Fig. 19 shows the result:—

60 mm. cylinder top ..	1,000 mm.	internal diameter
Junction 60 and 20 mm.	1,002 ,,	,, ,,
20 mm. cylinder, bottom	1,005 ,,	,, ,,

As seen from this result, the 20 mm. wall thickness has ceased to contract at 1,005 mm. internal diameter, and the 60 mm. wall thickness has continued to contract; but at the top it has contracted the full 2 per cent., while at the junction of the 60 mm. and 20 mm. wall thickness the contraction is less than required for the 60 mm. thickness and more than for the 20 mm. thickness.

Dr. Malzacher has constructed two diagrams. The upper one shows temperature on the vertical axis, and time on the horizontal axis. No. 1 is the 20 mm. wall thickness; No. 2 is the 60 mm. wall thickness. The result is according to experience, the thinner wall being cold in a shorter space of time than the thicker one. The bottom diagram (Fig. 20) shows cylinder diameter on the vertical axis and time on the horizontal axis. As shown from this diagram, the thinner section contracts much more rapidly than the thicker one, down to line marked Z.5, but at the point O on this line the contraction due to cooling met, and from this point the contraction of the thin section is slower, finally ending at the line Z1. The thicker section still continues to contract considerably, finally ending at the line Z1 and N. The junction of the 60 mm. and 20 mm. wall thickness is shown by the intermediate line between 1 and 2, which meets at point O and ends at Point P on line Z.1. It is quite evident that in such a casting with different contractions there must be tension, and the extent and magnitude of same may be considerable.

The composition of the steel, particularly if it happens to be one which hardens when cooled rapidly and has quick changes of section, has a considerable influence in producing tension cracks.

Table IV.

Steel.	Total clearance between ends of rods and flanges.	Total contraction per cent.	Deviation from normal contraction begins at	Contraction per cent. above end of Ar_1 per cent.	Contraction per cent. below Ar_1 per cent.	Remarks.
	mm.		deg. C.			
Acid ..	2	1.51	1,300	0.51	1.00	Bar torn near the flanges.
	4	1.45	1,250	0.44	1.01	,, ,,
	6	1.68	1,225	0.65	1.03	,, ,,
	8	1.75	1,100	0.69	1.06	Fine cracks found near flanges when a layer had been turned off the surface.
	10	1.79	1,150	0.76	1.03	
	12	2.10	—	1.04	1.06	
Basic ..	2	0.56	1,300	0.06	0.50	Bar torn near the flange.
	4	1.14	1,250	0.31	0.83	,, ,,
	6	1.54	1,150	0.57	0.97	Fine cracks found near the flanges when a layer had been turned off the surface.
	8	1.61	1,150	0.59	1.02	
	10	1.88	1,050	0.89	0.99	
	12	2.16	—	1.17	0.99	

Table V.—*Time of Varying Sized Bars to Attain High Temperatures.*

Diameter of bars. in mm.	Time in min.		Casting temp., deg., C.	
	Acid.	Basic.	Acid.	Basic.
20	1	1	1,470	1,480
30	3	2	1,500	1,460
40	5	5	1,480	1,500
50	6	6	1,470	1,480
100	—	8	—	1,510

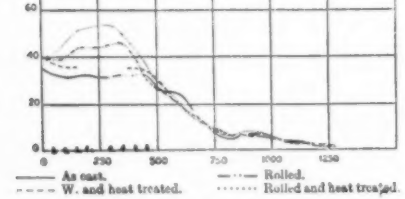


Fig. 17.—Carbon, 0.15 per cent.

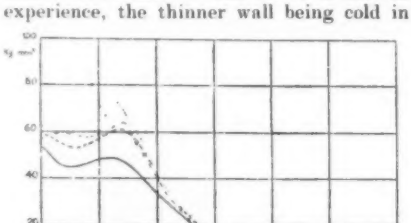


Fig. 18.—Carbon, 0.44 per cent.

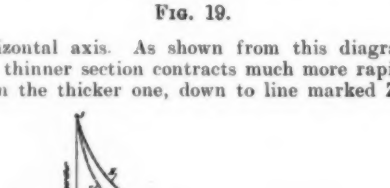


Fig. 19.

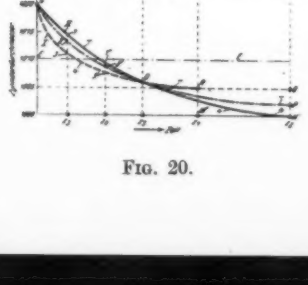


Fig. 20.

Determination of Gases in Metals, Particularly of Oxygen in Iron and Steel.

The following is a summary of the second part of a report (No. 72) of the Chemical Committee of the Association of German Ironmasters on "The Determination of Gases in Metals, particularly of Oxygen in Iron and Steel, by the Hot-Extraction Process," by Hans Diergarten, of Aix-la-Chapelle.

(1) Tests of the reducibility of pure oxides showed that the quantitative determination of oxygen by the hot-extraction process cannot be regarded as conclusive except with the use of silica. This is due to an initial reaction of an explosive nature and the consequent ejection of the test material.

(2) The 100 per cent. yield obtained of oxygen combined as silicon dioxide proves that with the vacuum values and carbon monoxide partial pressures of the oxygen apparatus described in the report, the oxygen can be recovered up to 100 per cent.

(3) By the addition of ferro-silicon and aluminium to silicon- and aluminium-free samples it is further indicated that silicates and aluminates can be quantitatively reduced. Data are given with reference to the temperatures and times required for the reduction of the oxides present in the steel. A temperature of 1,550 deg. C. appears sufficient for the reduction of all oxides. This and higher temperatures can be attained at the admissible vacuum value pressure.

(4) A theoretical explanation is given of the derangement of the hot-extraction process by higher aluminium and manganese contents, the effect of which, it is shown, is to restrict the range of application of the process.

(5) With homogeneous samples the agreement of parallel determinations (*i.e.*, the accuracy of the process) is very close (0.0002 to 0.0005 per cent. variation in the oxygen values). Particulars are also given of vacuum values and of the form and sizes of the samples, while the influence of the latter on the determination of the oxygen is examined.

(6) In a soft steel ingot oxygen segregation was found greater than that of the carbon, phosphorus and manganese, and only slightly less than that of the sulphur.

(7) The metallographical results are compared with the oxygen values, and the deduction that steels rich in manganese and aluminium have a higher oxygen content is found to be justified.

(8) A critical consideration of the hot-extraction process shows that notwithstanding its great rapidity and capabilities, its value and the possibilities of its application are reduced by evaporation phenomena. Further research is necessary to determine its spheres of use in figures.

The Institute of British Foundrymen.

LONDON BRANCH.

On Thursday, March 20, the London Branch had the privilege of welcoming and of hearing a lecture by Dr. Werner, of Düsseldorf. The subject of his lecture was "Some Recent Developments in Foundry Practice in Germany." The meeting, which was held at the Hotel Cecil, Strand, was preceded by a dinner in honour of Dr. Werner, also at the Hotel. The Branch-President (Mr. J. W. Gardom) was in the chair, and there was a large gathering, which included Mr. Wesley Lambert (President of the Institute and Past-President of the Branch), Mr. V. C. Faulkner (Past-President of the Institute and of the Branch), Mr. Goodwin (Past-President of the Institute), Mr. W. B. Lake, Mr. A. R. Bartlett and Mr. G. C. Pierce (Past-Branch-Presidents), and many members and visitors. His Paper, which appeared in our last issue, gave rise to an interesting discussion, the main points of which are set out below.

Discussion.

Mr. J. T. Goodwin (Past-President of the Institute), who opened the discussion, first expressed his great pleasure in having the opportunity of meeting Dr. Werner, and also of being again in the company of members of the London Branch. The enormous amount of good work which the Branch was doing, in furthering the friendly relationship between our Association and those of foreign countries, he said, was fully realised and appreciated by the Council. He also acknowledged the indebtedness of the whole foundry trade of this country to Dr. Werner for having presented so erudite a Paper. It was a Paper which set its readers thinking, for it described the extraordinarily rapid progress that had been made in all the main departments of foundry activity in Germany. With regard to cupolas, he said that those in the foundry industry in this country were fully alive to the fact that great improvements were required, and could be made at little expense; they awaited with interest the results of the work of the British Cast Iron Research Association on cupolas, and when these results were known he felt sure they would be equal to, if not better than, those described in Dr. Werner's Paper. Mr. Goodwin expressed the hope that on some future occasion British foundrymen might have the pleasure of hearing Dr. Werner discuss the merits of the English and German designed cupolas. Discussing the capabilities of the Brackelsberg rotating furnace, fired by pulverised fuel, he said he had been particularly interested in an illustration Dr. Werner had given of a number of small steel castings produced from steel melted in that furnace, because it was a great surprise to him to hear that the high temperature necessary to melt the steel could be obtained in that furnace.

Dr. Werner replied that they were steel castings, and not iron, and a few days ago Dr. Brackelsberg had shown him one of those small castings forged out into a knife blade and ground down to a sharp edge—almost a razor edge.

Commercial Competition.

Mr. Goodwin also asked if Dr. Werner could give data concerning the height of the shaft for the Weist preheated-air furnace. Continuing, he paid a tribute to the German foundry association upon its very great work in connection with the preparation of the memorandum which had been sent out to the German foundries. That memorandum must have been a very great help indeed to the foundries, and constituted an excellent check on costs and on one's ideas as to how castings should be made. The discrepancies between the prices quoted by different foundries in this country were appalling, and he often wondered, when he heard his competitors' selling prices, whether there was something wrong in his own particular foundry or whether his competitors had made serious mistakes. In this connection he recalled a recent occasion on which a representative of a foundry was pleading for an order and was offering castings at 14s. per ton less than the price quoted by one of his competitors. Yet he had actually told the prospective buyer that he was entirely in his (the buyer's) hands, and had asked at what price he could have the order. The buyer had said that another 10s. per ton reduction would secure it, and the seller had accepted the order on those terms. Thus he was selling at 24s. per ton less than his competitor. Mr. Goodwin begged foundrymen not to be led astray in regard to prices, and not to be too ready to condemn themselves because they lost an order to a competitor who was quoting lower prices. In these days of extreme competition one was apt to belittle one's self, not only in the matter of quoting, but also in regard to manufacture, and to accept lower prices than one should. Discussing the education of the younger foundrymen, he said it had been stated that we in this country were too fond of pleasure and did not pay sufficient attention to our business. That might or might not be so, but if the seniors gave them more encouragement in the way of education, on lines such as those suggested by Dr. Werner, they would all get on much better together. He did not suggest that the lads in the foundries should be expected to spend three or four hours at a technical school every evening after a hard day's work, because that would be too much for them, but they should, however, attend at least once, and, if possible, twice a week; a great deal of the education they required was such that could be given to them by the junior foremen, in the form of proper advice and instruction when they commenced to do a job instead of criticising their work after it had been done. Criticism was certainly a very healthy thing in its right place, but it was advantageous properly to initiate a youth. The practice of discussing the jobs with the younger men before the patterns went into the boxes had been a great success in his own foundry.

In a final expression of thanks to Dr. Werner, he said that the account given in the Paper of what was happening in Germany would be an encouragement to founders in this country to co-operate much more closely than they had done in the past.

An Employers' Federation Essential.

Mr. W. B. Lake (Past-President of the Branch) felt justified in repeating what he had said on previous occasions, namely, that if the British foundry industry were to make progress, such as had been made in the foundry industries of other Continental nations, the British founders must co-operate more closely, as the founders in those other countries were co-operating. Outside the British Cast Iron Research Association and the Institute of British Foundrymen, and half-a-dozen wages associations—if one excepted two or three comparatively small groups—there was no combination between the foundry owners of this country, but if they were to make headway that state of affairs must not continue. The whole trade must be grateful to Dr. Werner for his comprehensive account of the manner in which great progress had been achieved in the German foundries through co-operation.

Research Comparisons.

Mr. Horace J. Young, who has visited Germany on many occasions for the purpose of investigating various processes—and who emphasised that he is not one who accepts without very close examination the claims made for any process he is asked to investigate—paid a tribute to the German foundrymen for the thoroughness with which they tackled their problems and applied scientific principles to them. As an example of this thoroughness, he referred to the Perlit process, which he had been asked to investigate in Germany some years ago. Although he had gone to Germany on that occasion as a "doubting Thomas," and had asked every conceivable question in order to make things as difficult as possible, he had been convinced of the German honesty of purpose and of the merits of the process. He still remained convinced, and all who were working the process appreciated the enormous amount of science that was wrapped up in it. As a further example of the German mentality, he said that, as Dr. Werner had pointed out, the German foundrymen were deeply concerned about the German cupola designs, not so much from the point of view of the greatness of the cupola itself, as from that one of the vast fund of knowledge obtained by the study of it. Whereas our tendency was to examine a thing and then either use it or drop it altogether, the Germans studied it thoroughly and learned from it. Recently he had visited many German works, including those of the Maschinenfabrik Esslingen (at Esslingen), where he had seen wonderful foundries, furnaces and processes in operation. We had just been told by Mr. Goodwin that our British Cast Iron Research Association was going to astonish Dr. Werner; but it had yet to astonish us. He did not think this was the spirit of Dr. Werner's lecture which was to help us and not to astonish us. It was interesting to note that Dr. Werner had discussed the failures of the German Associations as well as successes. That was a valuable feature of his lecture and of his teaching. Apparently we did not experience failures in this country, because we did not talk about them. (Laughter.) Commenting upon a statement made by Dr. Werner, that he had been told by an engineer of the German steamship "Europa" that the castings in the turbines on that ship had given no trouble, whereas in earlier times there had been great trouble with cast iron owing to its growth, he emphasised that the success achieved on the "Europa" was a great example of the value of the application of science. He (the speaker) thought, however, that the value of science was becoming more appreciated also in this country. In this connection he pointed out that the engines of the British steamship "Mauritania" were made many years ago in a shop in which at that time no science was applied—at least, not his type of science—and the success of those engines was a tribute to the wonderful skill of the British moulder; nevertheless, that shop is now employing science. We in this country might well take to heart Dr. Werner's statement that in Germany there was little money for research, and that the money available was spent on important tests only. We also had little money for research, and should spend it on important tests only, tests which represented Research with a capital "R," carried out by real research workers—who were born, and could not be made. The volume of new work that had been going on in Germany and coming from Germany during the last six or seven years was amazing, and it was the result of the genuine co-operation Dr. Werner had described. When visiting the works of the Maschinenfabrik Esslingen he had been impressed by a system established there for the examination of failures. He noticed a large drawing on the wall of the pattern shop, and, when he had asked its purpose, was told that whenever failures occurred full-scale drawings of the parts of the castings containing the failures were prepared, and the engineer, the works manager, the foundry manager and the chemist considered them. This is an excellent system, because by its means that all concerned are becoming better educated.

British foundry metallurgists were every bit as good as German ones, but whereas the Germans used them and applied their work to the fullest extent, we did not do so, and were tending to look to circumlocution and to Government departments to do it for us. In conclusion, he hoped and believed that the Institute of British Foundrymen would tackle these problems, and they could rely upon the loyal help of every thinking foundryman and foundry metallurgist in Great Britain. It must be one objective for all and all for one objective, as it used to be and could so easily be again. Dr. Werner had spoken with great humility of splendid team work, and we saw the results obtained under his skilful and fearless leadership. Personally he welcomed Dr. Werner as a great man and a great example to us in times of trouble. If the I.B.F. ever wanted recruits, he (the speaker) could be counted as one of them.

Misapplied Research.

Mr. J. Shaw said that, notwithstanding Dr. Werner's fluent use of our language, he was placed at a disadvantage in replying to any serious criticism of the points raised. He perhaps appreciated that more from the fact that a short time ago he spent five weeks in a German home, where no English was spoken. British foundrymen had a great admiration for the research work on cast iron that has been done in Germany. He had only one fault to find—one that he was afraid was common in this country also—that was the tendency as soon as a new discovery was made to reason from the particular to the general application. For instance, on the question of superheating the metal, ample evidence was available of its benefit on metal with 3.2 per cent. carbon and upwards, yet even then its effect on a purely synthetic mixture was limited. But with the lower carbon, say 3 per cent. and under, as pointed out recently by Bardenheuer, no strength was gained, and in some cases it was detrimental. Again, in reference to the speaker's attitude on the effect of manganese on chill, there was little doubt that this element up to 0.7 per cent. in low carbon irons, both graphitised and reduced chill, but it did not seem to have that effect if the carbon were 3.6 per cent. and over. Dr. Werner had given a reason why the Shürmann cupola had not been more generally adopted. A reason for its retention in one of the largest works in Germany was that one could obtain higher carbons by its use. Now to obtain high carbons was not the simple thing it was thought to be, especially with phosphorus about 1 per cent., and he had serious doubts as to the theoretical saturation point of carbon under these conditions—at all events under cupola conditions. Mackenzie's tables also tended to confirm this doubt.

By far the most interesting points raised in this very interesting lecture were those relating to standard costing and standard estimating for moulding. The necessity for the former has been fully recognised both in Germany and America. The Gray Iron Institute of America had recently issued a standard cost system for its members, and it was hoped that members would at least know if they made a profit or not on their work. The Editor of The Foundry Trade Journal has advocated the adoption of some such scheme for this country for several years, but he was afraid he was but a voice in the wilderness so far. Once adopted we should or ought not to hear of such loose quoting that had been mentioned. Dr. Werner had brought home even a more important point than standard costing, viz., standard estimating for moulding; much of the difference in quoted prices could be ascribed to this cause. Taking the extreme case quoted by Dr. Werner, where from the same pattern and moulded in the same way, say bedding in, the estimated time varied from 62 minutes to 6 hours, and then applying a standard cost system to that example—especially as regards overhead. In one system, without entering into details, the overhead was spread over the four departments. The overhead for the moulders was fixed by the hours worked on the job. This means in the example given that in one case both moulding and overhead would be six times that of the second firm. If it was only for the information and methods adopted to arrive at the information, Dr. Werner's visit had been of great value, and he had placed us under a deep obligation.

British Research Efforts.

Mr. V. C. Faulkner (Past President of the Institute and of the Branch), discussing the comparative absence of co-operative arrangements in the foundry industry in Great Britain, and suggesting a possible reason, pointed to the attack made by Mr. Young on one existing association, and said that that sort of attitude was rampant throughout the country. Thus an association was started, and then it was attacked, and that attack did not assist its progress. What was required was constructive, and not destructive, criticism. Mr. Faulkner asked for information as to how derelict foundries were dealt with in Germany, because the policy in this connection had an effect on prices. When a derelict foundry came on to the market in Great Britain, the local grocer would lend a moulder £50 or so; the latter then manufactured castings, and the prices at which he sold them became the market prices of similar castings in Great Britain. The shipbuilding industry recently had decided to buy up derelict shipyards and put them permanently out of business. When the employers in the foundry industry established a strong federation they could arrange for the buying up of derelict foundries and deal with them as they should be dealt with. A few British firms were having physiological and psychological investigations made in their foundries, and were obtaining some interesting results. For example, they had discovered that when a man wheeled a barrow load of bricks to the cupola he travelled much faster than he did on the return journey, when his barrow was empty. Again, it was found that one man, who was a good workman, could not get good production on the moulding machine. Investigations were made, and it was discovered that the man was left-handed. Accordingly the arrangement of the machine was altered to render it easier for a left-handed man to work, and from that time onwards he had made the largest production in the shop. With regard to moulding sands, Mr. Faulkner said that a survey had been made by Prof. Boswell of British resources, but the results had been used only to a very limited extent. If he had an erudite employers' federation, however, it could gain much from a study of the data obtained. As to cleaning by water at high pressure, it was a matter of historical interest that the late Mr. Charles Markham had carried out a number of tests many years ago, just before the inception of oil sand cores, which caused the experiments to be abandoned.

In a final expression of thanks to Dr. Werner for having travelled from Düsseldorf to deliver his lecture, which was most comprehensive, he said that this was the first occasion on which the Branch had been addressed by the President of a foreign association; the innovation was most successful, and he hoped it would be repeated in future years.

British Secrecy.

Mr. A. F. Gibbs (senior vice-president of the Branch), discussing cupola construction, said that in the course of his visits to various foundries in the country, he had noticed that straight cupola walls were favoured, and he had been told by foundry foremen that they obtained the greatest economy thereby. The practice in Germany, however, judging from Dr. Werner's Paper, was quite contrary to the English practice in this respect. With regard to the collaboration which was practiced as between the various foundry owners in Germany, he said that the temperament of the German people must be altogether different from that of the English; one could hardly imagine a foundry owner or manager in this country giving away his secrets when, by reason of them, he could under-cut his rivals. It would be a very good thing for the foundry trade in this country if co-operation such as existed in Germany could be secured here.

An Appreciation.

Mr. H. C. Dews (junior vice-president of the Branch) did not attempt any detailed criticism, because it was difficult to pick out points for criticism at short notice from the wealth of valuable matter contained in the Paper, but he took the opportunity to express his deep appreciation of the fact that Dr. Werner had visited this country in order to address the Branch, and of the hospitality which had been extended to him (Mr. Dews) in Germany last year. On that occasion he had visited Germany for the first time since the war, and had been overwhelmed by the very great kindness and generosity and the unbounded hospitality of the German people. That kindness and hospitality was extended not only by the professional people with whom one was associated by reason of the bond of their study of metals, but also by the people outside the profession, and he was very glad indeed, therefore, to be associated with an expression of goodwill to Dr. Werner as a very fitting representative of that great body of enlightened and enthusiastic metal workers in Germany.

Mr. Joseph Deschamps asked for further information on the de-sulphurising process used for cast iron in Germany, and said he understood that processes based on the use of sodium carbonate had been successful there.

Author's Reply.

Dr. Werner replied to the discussion. Dealing with the question put to him as to the diameter-height ratio of the Schürmann cupola, he said that that had not been published so far, but the users of the Schürmann cupola knew what it was. Discussing Mr. Shaw's remarks concerning the qualities of low-carbon irons, he said it appeared that Mr. Shaw had overlooked the statement in the Paper to the effect that, inasmuch as irons having entirely pearlitic structures had cracked, the criteria of tensile and transverse test results were not sufficient, and that we must look for some other tests. Recently, in a lecture (which was published in "Die Giesserei," Mr. Meyersberg, the secretary of the Licensees Association which took care of the patents for high-quality cast irons, had suggested as another criterion a new ratio, which was the ratio of tensile strength to transverse strength.

Replying to Mr. Deschamps' question with regard to de-sulphurising, he said that Mr. Greiner and his associates, making use of the fact that silicon and iron had exothermic reactions at about 1,150 or 1,200 deg. C., had made up briquettes of steel chips and ferro-silicon. These were added to the iron in the cupola and the temperature was raised, but sodium carbonate was also added, and was melted quickly, to render the reaction very much stronger. It was useless using the ordinary marketed sodium carbonate, however; the material must undergo a certain process before being used for this purpose. The de-sulphurising reaction was very rapid when sodium carbonate was used, and the sulphur content was reduced to about half as much as it would be if this material were not added. Arrangements were made to deal with the fumes, though the fumes were not very disturbing. The briquettes were used in his foundry to the value of from £150 to £200 per month.

With regard to the problem of carbon and silicon, he advised his hearers to read some of the very many articles published in The

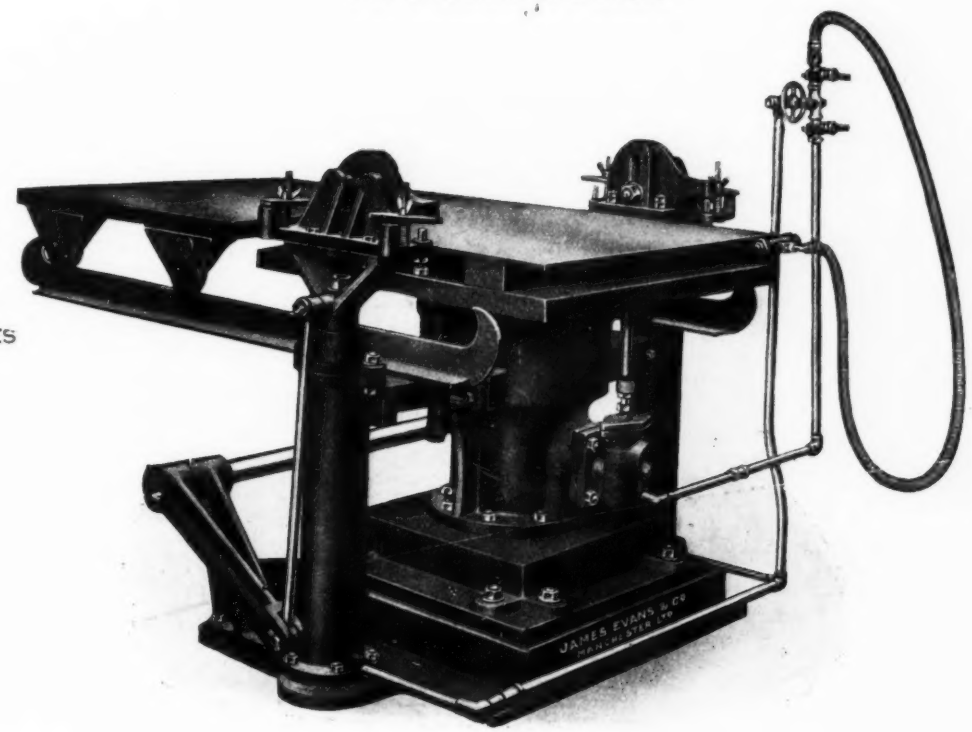
TYPE "C"

JAR RAM MOULDING MACHINE

with Turnover Pattern Plate.

For Pneumatic Power.

TWO MACHINES IN ONE.



UNSKILLED LABOUR ONLY REQUIRED.

The above machine illustrates a Jar Ram Machine with Turnover Pattern Plate which can also be used for Stripping Plate Work.

The machine has been designed to combine the two distinct features above mentioned, and is practically two machines in one, equally suitable for steel, iron, etc.

The machine as illustrated is arranged for work that requires turning over, such as steel moulding. And while the turnover arrangements are intended for general repetition work, by detaching the turnover plate from the trunnion brackets the machine can be used for stripping plate work by attaching the stripping plate to the trunnion brackets. Or, on the other hand, by removing the trunnion brackets as well, the table can be used for jolting general jobbing work.

A very important feature of the machine is the simplicity with which the intensity of the Jolt can be regulated when the operator has become accustomed to the use of the machine, which takes but an hour or so. The valves all being on the exterior of the machine are easily accessible, and there is an adjustable arrangement that will allow the jolt to be varied between 1½ in. to below ½ in. This being done without disturbing any part of the machine.

The machine is supplied with Withdrawal Carriage, Vibrator, and Blow-off Nozzle complete. It is substantially constructed to stand heavy wear and tear, and requires a minimum amount of skill to operate.

Another important feature of the machine is in the arrangement of the hard wood anvil block for receiving the shock. The blocks being carried well down the machine in a specially designed annular chamber give considerable relief to the foundations. It also provides against the possibility of fracturing the jolting table. Pitch pine blocks are also inserted between the foundation plate and the machine bedplate to assist in the relief on the foundations, and these features considerably improve the working advantages of the machine.

IT IS ALSO ENTIRELY OF BRITISH DESIGN AND MANUFACTURE.

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Foundry Trade Journal with regard to it, because those articles contained much more information that he could give in a few sentences.

Discussing the problem of organisation in this country, he suggested that joint meetings of the different branches in the British organisations should be held more frequently than they are for the discussion of problems of mutual interest, and also that arrangements should be made for the leading foundrymen of the country to dine together from time to time. In that way many questions could be solved, and they would make friends out of competitors. That had been found to be a great success in Germany, and even the representatives of the foundries which were making very large castings, and who were the greatest competitors, had been brought together. They met every two months and compared prices and other matters, and prices were very much higher than they had been two years ago. If a member were working under proper conditions in one district, and a man in another district started under-cutting in the first district, which was not his district, the secretary of the Association received a report about it and representations were made, but if they were of no avail he (Dr. Werner) had to go and talk to the man who was under-cutting. Of course, now and again there were competitors who were willing to accept anything the customers offered.

Finally, Dr. Werner expressed thanks for the reception accorded him, and expressed the hope that in the future the German Association might have the pleasure of hearing a lecture from a British foundryman.

A Vote of Thanks to Dr. Werner.

Mr. Wesley Lambert (President of the Institute), who proposed a hearty vote of thanks to Dr. Werner for his very interesting and illuminating address, said he had been astounded to learn within the past few weeks what a large amount of work is being done by the Foundrymen's Associations in Germany and in the U.S.A. in comparison with the activities of the Institute of British Foundrymen in this country. Dr. Werner's Paper most certainly should inspire all of us to make very much greater efforts in the future. He had at times felt, when attending Council meetings, that the efforts of the Council ought to be directed to work of a much more serious character than at present—efforts more on the lines of the work being done by the organisations Dr. Werner had referred to in his address. It was time that the Institute puts its house in order. The Paper contained much information for foundrymen to digest, and Dr. Werner was to be congratulated upon the lucidity with which he had presented his Paper. It was remarkable that a gentleman from abroad, and to whom English was a foreign language, could address a British audience in its own tongue so fluently and in such a charming manner. Stressing the importance of applying definite costing systems, Mr. Lambert said he had not realised, previous to Dr. Werner's address, that so much had been done in Germany in this connection, and that practically the whole of the foundries there had been brought into line. Whether this can be done in Great Britain he would not venture to say. As a nation, we are hidebound with all sorts of traditions, and a great deal of work would have to be done before we could override them. After a further expression of gratitude to Dr. Werner for the honour he had done the London Branch and the Institute as a whole, Mr. Lambert expressed the hope that other branches would invite the lecturer to address their members.

Mr. A. W. G. Bagshawe, seconding the vote of thanks, also expressed gratitude to Dr. Werner for the wealth of information he had given. With regard to the research carried out in Germany, including the investigations made into costs, he said he might have asked earlier how the money had been found to finance it. So far we in this country had made no organised effort in that direction, but it was not too late for us of the Institute of British Foundrymen to consider the provision of means for dealing with these subjects and of altering our rules and regulations, if necessary, in such a way that we could deal with them.

The Branch-President, supporting the vote of thanks, said he hoped Dr. Werner would not imagine, from the remarks that had been made during the discussion, that the foundry trade in this country was down and out. The founders were still living and obtaining orders. He was proud of the fact that he occupied the position of Branch-President at this stage, because if more co-operation were effected in the trade the London Branch would be able to claim that it had made a definite move in that direction by reason of the fact that it had invited Dr. Werner to lecture to its members, and to indicate what could be done.

The vote of thanks was accorded with acclamation, and the meeting closed.

Wales and Monmouth Branch of the Institute of British Foundrymen.

ANNUAL MEETING HELD.

The annual meeting of the Wales and Monmouth Branch of the Institute of British Foundrymen was held at the Great Western Hotel, Cardiff, on April 5.

The retiring President (Mr. W. S. Kinsman, Cardiff), gave a review of the year's work and paid tribute to the utility of the visits paid to the various works in the area, when it had been possible for members to see exceptionally good machinery which they would otherwise not have had an opportunity of doing. He mentioned the interest and help given by Mr. R. J. Richardson, the President-Elect, and hoped the Branch would give him as much support as he had had during his year of office.

Annual Report.

The Hon. Secretary (Mr. J. J. McClelland), in giving his report, said that the Branch had now been in existence six years and had been struggling against adversity all along the line. The Council had worked against odds and yet had made progress. Mr. P. Leonard Gould, the first President, had established a precedent which each successive President had followed, and the Branch could congratulate themselves that their Presidents had done much to build up the Branch. In only one year had there been a debit balance, and that was when some of the subscriptions had gone into arrear, but this fact was more than counterbalanced by the one that the following year (the present one) there was a credit balance of £20, leaving a net credit balance of £14 18s. 2d.

The Branch has had magnificent help from the University College of South Wales, where meetings were now held when in Cardiff. Local members had also been used at the meetings, thereby saving expense, and the Papers given were equal to those given at any other Branch. Mr. McClelland said he was proud to be associated with such an energetic band of men as those who constituted the Branch Council. Membership had increased to 65, two of whom resided as far afield as India. Eighteen members had left the Branch during the six years it had been in existence. Mr. McClelland added he hoped the principles established would be followed by successive officers.

Mr. Kinsman said he now had a very pleasant duty to perform, namely, to ask Mr. Ben Hird to accept the Institute's diploma. In June last in London, the Institute had held an International Convention at which many Papers were given. One was called "Coal Dust"—a subject not often discussed. This Paper created quite a stir at the Convention and had been awarded a diploma. The recipient was Mr. Ben Hird, a past Branch-President. His enthusiasm had done much to help the Branch.

Mr. Hird, after thanking the meeting, said it was quite a pleasure to feel that the little service rendered had been recognised. Every member was doing everything within his power to promote the welfare of both the Branch and the industry. They were doing their best to try to put the trade on a better footing and to raise its standard to the position it deserved.

The election of officers resulted as follows:—President, Mr. R. J. Richardson (Pontypridd); vice-presidents, Mr. William Williams (Cardiff) and Mr. Fred J. Taylor, J.P., O.B.E. (Briton Ferry); hon. secretary and treasurer, Mr. J. J. McClelland (Cardiff); Branch Council, Mr. W. R. D. Jones (University College), Mr. Rogers (Llanelly) and Mr. C. E. Richards (Cardiff).

Votes of thanks were accorded the retiring President and the hon. secretary.

Presentation to Mr. McClelland.

Mr. P. Leonard Gould said his interest in the Institute of British Foundrymen was still very keen, and he considered it a very great honour to be asked to voice their wishes—namely, to show some small recognition of the work done by Mr. McClelland, the hon. secretary. It had been his privilege to occupy the chair of the Branch for the two first years, and he was, therefore, in a special position to know that it would not be possible to repay Mr. McClelland for the excellent work he had done. The district was very widespread, and to sow the seed six years ago took much courage, which, he thought, only a Scotsman living in Wales would have attempted. Mr. Gould said the Branch also wished to thank the secretary's family for their help and the unselfishness shown by Mrs. McClelland for sparing her husband so much for the benefit of the Branch. It was the unanimous wish of the Branch that a small token of esteem should be handed to Mr. McClelland, to whom he was sure it must be a pleasure to see the Branch now established on a sound financial basis. Mr. Gould then handed Mr. McClelland a wallet containing a cheque.

Mr. McClelland said he appreciated the thought which prompted the gift more than the gift itself. He also felt he owed a debt of gratitude to all who had given their aid. The Branch had excellent officers, especially Mr. Hare and Mr. Wall, who had rendered yeoman service to the Branch.

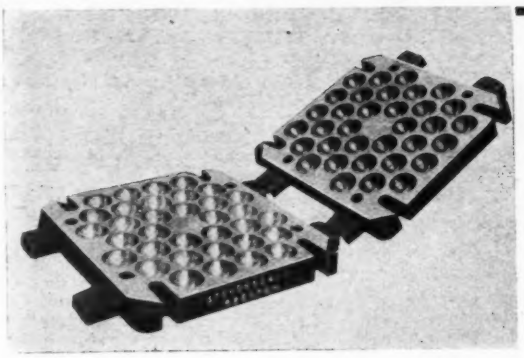
Mr. J. P. Galletly, in presenting a clock to Mrs. Ethel Rawden, said that the Branch wished her to accept this gift as a token of their affection and appreciation of her assistance at its meetings. They would not feel complete without her.

Mrs. Rawden said her mind had been going back to six years ago, when Mr. J. Ellis (a past-president of the Institute) was in Cardiff, and the evenings he spent discussing the formation of a branch in Cardiff. She knew that it had been a pleasure to her father to have been of service to the Branch, and she, too, had enjoyed every meeting as much as any member present. She hoped the clock would serve as an inspiration to her children to follow on, trying to do a little bit for others.

The business of the meeting, having been concluded, was followed by a concert.

An American Definition of Wrought Iron.—At a recent meeting of Committee A-2, of the American Society for Testing Materials, the following definition was recommended for adoption as standard:—"Wrought iron is a ferrous material aggregated from a solidifying mass of particles of highly-refined metallic iron, with which without subsequent fusion is incorporated a minutely and uniformly distributed quantity of slag." The Committee also voted to delete the definition of "puddling" from the list of definitions, since no other process of manufacture is defined by the Society; the process clauses of all specifications covering wrought-iron products will be revised to eliminate reference to the process of manufacture.

F.T.J. 18/4/30



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Trade Talk.

The date of the British Empire Exhibition at Buenos Aires has now been definitely fixed. It will be open from March 14 to April 27, 1931.

Messrs. Thomas Thomas & Company, iron and steel merchants, of Middlesbrough, have opened a branch office at 12-14, St. James's Row, Sheffield.

The Hon. Roland D. Kitson has resigned his seat on the board of the Monk Bridge Iron & Steel Company, Limited, owing to pressure of other business.

Mr. D. O. Evans, of the Mond Nickel Company, Limited, has been elected a director of Messrs. Henry Gardner & Company, Limited, in the place of Mr. W. B. Lawson, who has resigned.

Mr. W. H. Hutchinson has been elected by ballot to succeed Mr. J. T. Brownlie as President of the Amalgamated Engineering Union. Mr. Hutchinson is a patternmaker by trade, and is 51 years of age.

The Lots Road Power Station of the London Underground Railways is being enlarged and re-equipped. The cost of the alterations and the provision of new plant is estimated at not less than £1,000,000.

Six vessels, aggregating 26,000 tons, were launched from the Belfast shipyards during the past three months, four by Messrs. Workman, Clark (1928), Limited, and two by Messrs. Harland & Wolff, Limited.

The partnership between Messrs. Arthur Young and G. P. Pedge, carrying on business as iron and steel merchants and agents, at Town Hall Chambers, Fargate, Sheffield, under the style of Arthur Young & Company, has been dissolved.

Viscount Ednam, chairman of the Earl of Dudley's Round Oak Works, Limited, speaking at Sedgley, South Staffordshire, recently, said that at the Round Oak Works they were just about to alter their steel furnaces to an Italian design (presumably the "Terni") which had just been developed.

Imperial Chemical Industries, Limited, have entered into an agreement with the Tees Commissioners for the purchase of a large area of land on the north bank of the Tees at Port Clarence to establish a wet dock and chemical works. These are in addition to the firm's works at Billingham.

Messrs. Cammell Laird & Company, Limited, Birkenhead, have received an order from the London Midland and Scottish Railway Company for three cargo vessels for their Goole and Continental services. Two of the ships will be fitted with triple-expansion engines and one with machinery of the Lentz type.

Mr. F. A. Orchard has joined the staff of Mr. D. Maxwell Buist, engineer for the Central Electricity Board in the North-East England area. Mr. Orchard has been 12 years with Messrs. Merz & McLellan, Newcastle. Previously he was associated with the British Thomson-Houston Company, Limited, and other firms.

Plans for widening the scope of the Tin Industrial Applications Committee have been formulated. The Committee proposes to undertake a certain amount of experimental research abroad, help in the development of new processes and industries consuming tin, and stimulate possible markets. It has been decided to change the Committee's name to the Tin Research and Industrial Applications Committee.

Messrs. R. B. Tennent, Limited, Whifflet Foundry, Coatbridge, have just completed the manufacture of two large plate-mill rolls for the Port Talbot Steel Works, South Wales. This class of roll had previously been manufactured on the Continent, and it was in strict competition with Continental firms that Messrs. Tennent obtained the order. The first roll was despatched on April 10. Both, when cast, weighed 50 tons each, and are the largest in use in Britain. The barrels are 43½ in. dia. and 12 ft. 7 in. long.

New Companies.

British Electric Welding Machines, Limited.—Capital £20,000. Solicitors: Restall, Round & Gloster, 21, Waterloo Street, Birmingham.

Barton & Sons (1930), Limited, Green Street, Wallsall.—Capital £10,000. Malleable iron and brass founders, &c. Permanent governing director: A. Barton

Personal.

Mr. J. G. Pearce, director of the British Cast Iron Research Association, is to address the April meeting of the Detroit Foundrymen's Association, which has been postponed until May 2, at the Masonic Temple, Detroit.

Professor Henry Louis, it is interesting to note, has been invited to attend the Conference of the Federation des Associations Belges d'Ingenieurs in a triple capacity. He has received an invitation as President of the Iron and Steel Institute, immediate past-President of the Institution of Mining Engineers, and as secretary of the North of England Institute of Mining and Mechanical Engineers. The gathering will be held during the celebration of the Centenary of Belgian Independence. Professor Louis will also attend the Liége Congress of Mining, Metallurgy and Applied Geology.

Mr. Geoffrey Duke Burton has been appointed managing director of the Earl of Dudley's Round Oak Works, Limited, in succession to the late Mr. J. W. Trowsdale. Mr. Burton was educated at The Leas School, Hoylake, and afterwards at Trinity College, Glenalmond, and Queen's College, Cambridge. At the outbreak of the war he obtained a commission in the Royal Engineers, and served in the Dardanelles, and later in Egypt and Palestine. He was twice mentioned in despatches, and finally held the post of assistant director of works. At the end of the war he returned to Cambridge, and then joined the Leeds Forge Company, Limited, and rose to be works manager. He was next appointed manager of the Earl of Dudley's Round Oak Works, Limited, but left in 1926 to take up a post with the Metropolitan Carriage, Wagon & Finance Company, Limited. After the amalgamation of this company with the rolling-stock interests of Messrs. Cammell, Laird & Company, Limited, he was appointed first production general manager and finally commercial general manager of the joint undertaking, and he has held the latter post up to the present time.

Wills.

Pochin, R. F., of St. Johns Road, Leicester, ironfounder £34,345

Marsden, William, of Halifax Road, Brighouse, Yorks, brassfounder ... £10,699

Whitehead, J. H., a director of Messrs. Taylor, Wordsworth & Company, Limited, textile engineers and iron-founders, Leeds £109,507

Reports and Dividends.

Brown Bayley's Steelworks, Limited.—Dividend of 6d. per share, tax free, on the preference shares, discharging arrears to July 31, 1928.

Head, Wrightson & Company, Limited.—Payment of six months' preference dividend due on March 31 is postponed until after completion of the balance-sheet for the year ending April 30.

Cammell Laird & Company, Limited.—Profit for 1929, after charging full depreciation and paying debenture interest, of £11,809. A credit balance of £16,931 is carried forward, no dividends being proposed.

Monk Bridge Iron & Steel Company, Limited.—Loss for 1929, £897; debit brought forward, £140,062, making a debit balance of £140,959. The directors have decided to close the firm of John Butler & Company, Limited.

Ocean Coal & Wilsons, Limited.—Balance available, after paying debenture interest and preference dividends and interim dividend of 2 per cent. on the ordinary shares, £170,668; further dividend of 3 per cent. on the ordinary and employees' shares, making 5 per cent.; carried forward, £14,635.

British Thomson-Houston Company, Limited.—Profit, £458,381; brought in, £203,066; interest on debentures and loans, £136,621; depreciation, etc., £153,864; directors' fees, £1,700; preference dividends, £84,000; dividend on ordinary shares of 5 per cent., £80,000; carried forward, £205,262.

English Electric Company, Limited.—Profit for year, £71,343; interest on 5½ per cent. first mortgage debentures, £37,480; interest on 6 per cent. convertible debenture stock, £78,681; directors' fees, £2,033; leaving loss of £47,211. The scheme of financial reorganisation recently approved had not taken effect at the end of 1929.

Company Meetings.

Henry Gardner & Company, Limited.—The annual meeting of Messrs. Henry Gardner & Company, Limited, was held recently in London. Mr. Henry Gardner (chairman), who presided, said: The year has been a difficult one, the fall in nearly every commodity having been almost continuous. The present meeting marks an event in our existence—namely, the fusion of our interests with those of the British Metal Corporation, Limited. In substituting co-operation for competition we hope that the benefits will be mutual. There have been many outcries about depressed trade, and there is no doubt that the over-speculation indulged in at home and still more that which prevailed in the United States, with their inevitable crashes, have had a very depressing effect. This may last for some time, and the position is complicated by an over-production of nearly every commodity. I do not feel, however, that there is any need for pessimism in the long run.

Millom & Askam Hematite Iron Company, Limited.—Mr. G. Mure Ritchie presided at the annual meeting of the Millom & Askam Hematite Iron Company, Limited, held at Liverpool on April 7, and in moving the adoption of the report, dealing with a quarter-year's activities, explained that in future the results of the Alquife Mines & Railway Company, Limited, would be incorporated with the accounts of the Millom Company and the year-end would be December 31. He emphasised the important ore properties owned by the company, and, referring to the iron trade, said there had been keen competition, and pointed to the fact that wages were much lower in every country on the Continent where iron was produced. On a poll the report and accounts were agreed to by 529,483 votes to 148,258. Mr. Ritchie was re-elected a director. The meeting elected Mr. Robert Heath a director in the place of the Hon. Robert James. The meeting passed a resolution of confidence in Mr. Ritchie.

British Aluminium Company, Limited.—Presiding at the annual meeting of this company, Lieut.-Colonel S. H. Pollen (chairman), in moving the adoption of the report, said that anticipations of a satisfactory volume of sales during 1929 had been realised. The demand had been good, and their total deliveries for the year under review were well in advance of their previous record. Against this increased tonnage sold they had, unfortunately, to record a greatly intensified competition in the market for a number of their products, with a consequent reduction in their average selling price. In the face of this competition they had spared no pains to stimulate the demand. A large part of their output was absorbed in the transport industries, namely, automobiles, railways, aircraft and shipbuilding. The electrical industry, like the transport and chemical industries, consumed an ever-increasing quantity of aluminium, and considerable strides had been made during the past year. In regard to the current year, industrial conditions were somewhat obscure, but he did not see any signs of a decrease of demand for their metal at the present time, and they looked forward with confidence to being able to dispose of all their production, including that which they might expect from the new Lochaber works.

Harland & Wolff, Limited.—The annual meeting of Messrs. Harland & Wolff, Limited, was held on April 7 at the London office of the company. Lord Kylsant (chairman), who presided, said that they had so far weathered successfully the most prolonged and abnormal period of depression that the shipbuilding industry had perhaps ever known. Their output of vessels for 1929 exceeded that of any other shipbuilding organisation in the world. With regard to work in hand, at Belfast all their slips were occupied, while at Govan four out of the seven slips were occupied. While the volume of work in hand was fairly satisfactory in present circumstances, it was still difficult to obtain fresh orders at reasonable prices and on satisfactory financial terms. The repair works at Liverpool and Southampton had been well occupied throughout the year. Their important interests in steel and coal undertakings had not paid any dividends during the year, although these companies made small profits. During the difficult years they had been passing through, close attention had been paid to the co-ordination of their various establishments, the standardisation of fittings, the installation of further labour-saving devices, the elimination of waste and the economising of every process. Notwithstanding the prolonged shipping depression, he had no doubt as to the ultimate recovery of prosperity.

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Iron and Steel Markets.

Pig-Iron.

MIDDLESBROUGH.—The impending Easter holiday suspension is already influencing quieter conditions in the Cleveland iron market, and this, coupled with the fact that consumers have mostly covered their more immediate requirements, has limited current business to a very considerable extent during the past week. Another complicating factor in the position is undoubtedly the uncertainty prevailing on the probable effect of the Budget proposals on trade prospects generally, while the steady growth of the unemployment returns is also a disturbing feature as an index pointer to increased expenditure of our national resources. On the whole, therefore, the outlook is not entirely encouraging, and traders regard with grave misgivings the continued arrival in Scotland of shipments of Indian basic iron and French foundry iron. Sales to Scotland have certainly improved, but these imports from abroad limit the outlets for Cleveland iron. Exporters report that there is still a fair volume of inquiry from overseas for Cleveland iron, but this business is maturing slowly, the competition of Continental producers being very keen indeed. Cleveland prices continue firm, local quotations, f.o.t. or f.o.b., being as follow:—No. 1 foundry iron, 70s.; No. 3 G.M.B., 67s. 6d.; No. 4 foundry, 66s. 6d.; No. 4 forge, 66s. per ton.

The decline in values of East-Coast hematite continues unchecked, with French competitors still under-selling British products in this and other markets at home and abroad. The position would be less serious if the home demand were brisk, but British steel makers are buying very sparingly, and every week the conviction grows stronger that the output will have to be reduced. The one satisfactory feature from the producers' point of view is that cost of production is still falling, but even that does not balance the decline in prices. The current quotation for East-Coast mixed numbers is 75s., and for No. 1 quality 75s. 6d. per ton. On the North-West Coast, Bessemer mixed numbers are quoted at 76s. to 79s. per ton at works.

LANCASHIRE.—As is usually experienced in the pre-holiday period in local markets, the demand for foundry pig is in limited volume, and deliveries on account of current contracts are much below the recent average. Consumers in this area have little inducement at present to enter into fresh contracts, and are quite prepared to hold off for another week or two to see what develops at the meeting of Midland Counties makers at the end of this month. Meantime, quotations remain stationary, with Derbyshire and Staffordshire No. 3 quality firmly held at 77s. per ton, including delivery to local stations.

THE MIDLANDS.—Pending the meeting at the end of the month of the Pig-iron Producers' Association to decide the question of future prices, consumers in the Black Country are holding off the market, and business generally is on a moderate scale. Current prices meanwhile remain firm, Northants No. 3 being quoted 75s. and Derbyshire and North Staffordshire No. 3 78s. 6d., all per ton delivered local stations.

SCOTLAND.—There are still many complaints in this market of lack of business in pig-iron, consumers generally being short of work. There is no change in the price of No. 3 Scotch foundry, which remains at 78s. f.o.t. furnaces.

Finished Iron.

Markets for this class of material in the Midlands are experiencing only a moderate demand at the moment, and at Birmingham, apart from the fairly good support being given to the makers of marked bars, conditions are as dull as possible. The ironworks cannot accumulate anything near sufficient tonnage to keep the mills running except in a spasmodic manner. Marked bars are unchanged at £12 10s. at works, but crown iron quotations continue to vary to a considerable extent, according to the nature of the order and the district in which the iron is made. From this area £10 5s. is an average level, but from other districts £10 is quoted, with nut and bolt quality bars at £9 5s. to £9 7s. 6d.

Steel.

British steelworks just at present are rather unevenly employed, some makers having fairly well-filled order-books, while others are, unfortunately, only partially engaged. Export business for the past week or two has been particularly poor, and the inquiry which developed recently from some of the overseas markets has failed to materialise, to any extent, into actual business. At Sheffield quotations rule unchanged, as follow:—Siemens acid billets, £9 10s.; basic billets, soft, £6 10s.; medium, £7 12s. 6d. to £8 2s. 6d.; hard, £9 2s. 6d. to £9 12s. 6d.; acid wire rods, £12 5s. to £12 10s.; basic wire rods, soft, £8; medium hard, £9 15s. to £10; hard, £10 10s. to £11. In the tinplate market quotations are:—Coke quality tinplates, 18s. 3d. to £18s. 6d. basis, net cash, f.o.b. Welsh ports.

Scrap.

Depression is even more pronounced in markets for foundry scrap material than has been reported of late, and merchants are experiencing increased difficulty in disposing of superabundant stocks of metal. At Middlesbrough this week only small sales of ordinary heavy cast iron are reported at 61s. per ton, but there are very few buyers of machinery quality, which is offered in handy sizes at 64s. In Scotland dealings in cast scrap continue quiet, with quotations for machinery quality at 67s. 6d. to 69s., and for heavy ordinary cast iron around 64s. Railway chairs are at 67s. 6d., light cast iron 59s., and cast-iron firebars 57s. The above prices are all per ton delivered f.o t. consumers' works.

Metals.

Copper.—The outlook for the warrant copper market at the moment may be best described as uncertain, with values tending steadily to lower levels. In view of the large increase which has taken place in American stocks of refined copper, the announcement that the Copper Exporters, Inc., had reduced the price of export and domestic copper by 4 cents to 14.30 c. and 14 c. respectively was generally expected.

Closing quotations:—

Cash.—Thursday, £68 5s. to £68 10s.; Friday, £67 10s. to £67 15s.; Monday, £67 5s. to £67 10s.; Tuesday, £63 12s. 6d. to £63 17s. 6d.; Wednesday, £58 15s. to £59.

Three Months.—Thursday, £67 5s. to £67 10s.; Friday, £66 5s. to £66 7s. 6d.; Monday, £66 2s. 6d. to £66 7s. 6d.; Tuesday, £63 to £63 5s.; Wednesday, £58 5s. to £58 7s. 6d.

Tin.—Conditions in the market for standard tin have been much disturbed by reports to the effect that the Eastern smelters might produce a record quantity of refined metal this month, and that shipments from the East would be on a large scale throughout April, having rather shaken the confidence of the market. The delay in the effect of curtailment is, however, due to the fact that only some 30 per cent. of producers were restricting their output in January. A general meeting of the Tin Producers' Association was held on Wednesday, when the Council reported on the progress of the restriction of output scheme.

Official closing prices:—

Cash.—Thursday, £166 to £166 10s.; Friday, £167 7s. 6d. to £167 12s. 6d.; Monday, £165 10s. to £165 15s.; Tuesday, £164 10s. to £164 12s. 6d.; Wednesday, £164 7s. 6d. to £164 10s.

Three Months.—Thursday, £168 to £168 5s.; Friday, £169 10s. to £169 12s. 6d.; Monday, £167 12s. 6d. to £167 17s. 6d.; Tuesday, £166 12s. 6d. to £166 15s.; Wednesday, £166 10s. to £166 12s. 6d.

Spelter.—The demand from consumers continues on a restricted scale. There has been heavy selling and liquidation during the week, and as a consequence prices have been difficult to maintain. There is at the moment no sign of development in the trade.

Daily quotations:—

Ordinary.—Thursday, £18; Friday, £18 3s. 9d.; Monday, £18 2s. 6d.; Tuesday, £18 1s. 3d.; Wednesday, £17 18s. 9d.

Lead.—The lead market has been extremely quiet during the past week. The home demand was poor, and prices generally had a downward tendency.

The week's prices have been:—

Soft Foreign (Prompt).—Thursday, £18 11s. 3d.; Friday, £18 12s. 6d.; Monday, £18 13s. 9d.; Tuesday, £18 13s. 9d.; Wednesday, £18 11s. 3d.

Falkirk and Australian Tariffs.

The severance of trade relations between the foundries of the Falkirk district and the Australian Commonwealth would appear to be now unavoidable in view of that country's new tariff policy, in relation to light castings. The view of a local publicity official is that the Australian Government's efforts to improve the trade position of the country by imposing an overwhelmingly heavy taxation on, or the total prohibition of, iron imports of this class had been received as unwelcome news in Falkirk industrial circles. The proclamation issued by the Australian Government prohibits the importation of a wide variety of products, and already orders which had been received by Falkirk firms were now cancelled. Among the articles to which the prohibition regulations apply are porcelain enamelled baths, cast-iron pipes and fittings, gas and electric cooking and heating appliances and similar articles. A scheme is in course of preparation by the Federation of British Industries for consideration, both in the Dominions and at home, under which such economic difficulties as now face Australia will be avoided, while sudden, violent changes in import regulations should no longer be possible, as all such matters will be dealt with through a system of round-table conferences. Australia was formerly a very big market for Falkirk goods, such as grates, stoves and baths, with a certain amount of gas-cooking plant. Australia began some years ago to manufacture these articles for herself, and has been taking men from this country, and particularly from the Falkirk works, to assist in the production of the goods. They have copied the patterns, and, with the assistance of a good proportion of Falkirk moulders, are successful in producing the articles in Australia.

Buenos Aires Exhibition.

The date of the great British Empire Exhibition at Buenos Aires has now been definitely fixed, and it will be open from March 14 to April 27, 1931. This is a great improvement on the dates originally proposed (February 18 to April 2). By the middle of March the weather in Buenos Aires is becoming pleasantly cool, the population has returned from its summer holidays and business in all directions is becoming more active.

The early autumn, that is March and April, is, in fact, the recognised buying season for many classes of goods. The later date also avoids clashing with the British Industries Fair, and it will now be possible for members of manufacturing firms to proceed from that to the Buenos Aires Exhibition.

Flux for Brass.—Mix together the following:—Quicklime, 1 oz.; saltpetre, ½ oz.; common soap, 2 oz. The above should be made into balls and placed in the crucible immediately same is taken from the furnace. Good results are obtained from the above, and the amounts given are together sufficient for approximately 1 cwt. of metal.

Preserving Leather Belting.—The life of a leather belt can be considerably prolonged if the following instructions are carefully followed:—Mix together: Castor oil, 3 quarts; tallow, 1½ lbs.; powdered resin, 1½ czs.; dry hard soap, 3 ozs. Melt the whole to a liquid. Before applying this to the belt, the latter should be washed down with hot (but not boiling) water. Repeat the process annually, or twice a year if not inconvenient.

XUM

Sterling

SOLID RIBBED ROLLED STEEL
MOULDING BOXES

are recognised as standard box equipment by the leading foundries and engineering establishments in this country and overseas.

Because they speed up production, save unnecessary labour, produce accurate castings and make for all-round efficiency in the foundry.

STERLING BOXES WILL SAVE THEIR COST IN A FEW MONTHS.

WRITE FOR CATALOGUE No. 37.

Sterling

FOUNDRY BARROWS

for

SAND, COKE, and PIG-IRON

are sturdily built to withstand the heavy duties and harsh treatment of the severest foundry service.

STERLING FOUNDRY SPECIALTIES LTD.

London Office:
13, VICTORIA STREET, S.W.1.

BEDFORD.

Telephone: 3345 BEDFORD.
Telegrams: "STERFLASK, BEDFORD."
Code: WESTERN UNION.

Glasgow: ALBERT SMITH & CO., 60, St. Enoch Square, GLASGOW, C.1.
Newcastle-on-Tyne: LAWSON, WALTON & CO., LTD., Handyside Arcade, NEWCASTLE-ON-TYNE.
Manchester: F. L. HUNT & CO., Chapel Street, SALFORD, MANCHESTER.

WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	58	15	0
Three months	58	5	0
Electrolytic	65	0	0
Tough	65	0	0
Best selected	69	0	0
Sheets	110	0	0
India	89	0	0
Wire bars	83	0	0
Do. April	83	0	0
Do. May	83	0	0
Ingot bars	83	0	0
H.C. wire rods	84	15	0
Off. av. cash, March	69	5	10⅝
Do., 3 mths., March	67	13	2 13/14
Do., Sttlmnt., March	69	5	11⅜
Do., Electro, March	83	16	6½
Do., B.S., March	76	11	3
Do., wire bars, March	84	5	0
Aver. spot price, copper, Mar.	69	5	10⅝

Solid drawn tubes 15d.
Brazed tubes 15d.
Wire 11¼d.

BRASS.

Solid drawn tubes 12¾d.
Brazed tubes 14¾d.
Rods, drawn 12¼d.
Rods, extd. or rlld. 7¼d.
Sheets to 10 w.g. 10⅞d.
Wire 10¾d.
Rolled metal 10¾d.
Yellow metal rods 7¼d.
Do. 4 × 4 Squares 8d.
Do. 4 × 3 Sheets 8¼d.

TIN.

	£	s.	d.
Standard cash	164	7	6
Three months	166	10	0
English	165	10	0
Bars	167	10	0
Straits	166	15	0
Australian	165	15	0
Eastern	167	5	0
Banca	169	10	0
Off. av. cash, March	164	19	0⅛
Do., 3 mths, March	167	0	2⅝
Do., Sttlmt., March	164	19	2
Aver. spot, March	164	19	0⅛

SPELTER.

	£	s.	d.
Ordinary	17	18	9
Remelted	17	5	0
Hard	15	0	0
Electro 99.9	20	5	0
English	18	10	0
India	16	5	0
Zinc dust	25	0	0
Zinc ashes	5	0	0
Off. aver., March	18	11	1⅛
Aver., spot, March	18	6	0⅛

LEAD.

	£	s.	d.
Soft foreign ppt.	18	11	3
English	20	0	0
Off. average, March	18	17	5 5/16
Average spot, March	18	16	1⅛

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	28	0	0
Do. V.M. ex-whf.	26	15	0
Rods	30	0	0
Boiler plates	24	10	0
Battery plates	25	0	0

ANTIMONY.

	£	s.	d.
Special brands, Eng.	40	0	0
Chinese	29	10	0
Crude	20	0	0

QUICKSILVER.

	£	s.	d.
Quicksilver	22	15	0

FERRO-ALLOYS AND STEEL-MAKING METALS.

	£	s.	d.
Ferro-silicon—			
25%	7	15	0
45/50%	11	10	0
75%	19	0	0

Ferro-vanadium—
35/50% 12/9 lb. Va.
Ferro-molybdenum—
70/75% c. free 4/2 lb. Mo.
Ferro-titanium—
23/25% carbon-free 9d. lb.
Ferro-phosphorus, 20/25% £16 0 0
Ferro-tungsten—
80/85% 2/10 lb.
Tungsten metal powder—
98/99% 3/1 lb.
Ferro-chrome—
2/4% car. £30 10 0
4/6% car. £23 7 6
6/8% car. £22 12 6
8/10% car. £22 0 0
Ferro-chrome—
Max. 2% car. £33 10 0
Max. 1% car. £37 17 6
Max. 0.70% car. £39 15 0
70% carbon-free 11d. lb.
Nickel—99% cubes, or pellets £175 0 0
Ferro-cobalt 9/6 lb.
Aluminium 98/99% £95 0 0
Metallic chromium—
96/98% 2/7 lb.
Ferro-manganese (net)—
76/80% loose £11 15 0
76/80% packed £12 15 0
76/80%, export £11 10 0
Metallic manganese—
94/96%, carbonless 1/4 lb.
Per ton unless otherwise stated.

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten £0 2 2
Finished bars, 18% tungsten £0 3 0
Per lb. net, d/d buyers' works.
Extras—
Rounds and squares, 3 in. and over 4d. lb.
Rounds and squares, under ½ in. to ¼ in. 3d. lb.
Do., under ¼ in. to 1/16 in. 1/- lb.
Flats, ½ in. × ¼ in. to under 1 in. × ⅛ in. 3d. lb.
Do., under ½ in. × ¼ in. 1/- lb.
Bevels of approved sizes and sections 6d. lb.
Bars cut to length, 10% extra.

SCRAP.

	£	s.	d.		£	s.	d.
South Wales—							
Heavy steel	3	4	0	to 3	5	0	
Bundled steel and shrngs.	2	19	0	to 3	3	0	
Mixed iron and steel	2	18	0	to 3	0	0	
Heavy cast iron	2	18	0	to 2	19	0	
Good machinery for foundries					3	0	0
Cleveland—							
Heavy steel					3	0	0
Steel turnings					2	12	6
Cast-iron borings					2	8	0
Heavy forge					3	14	6
W.I. piling scrap					3	10	0
Cast-iron scrap	3	1	0	to 3	4	0	
Midlands—							
Ord. cast-iron scrap					3	3	6
Heavy wrought					3	15	0
Steel turnings					1	17	6
Scotland—							
Heavy steel					3	2	6
Cast-iron borings					2	9	0
Wrought-iron piling					3	18	6
Heavy machinery					3	7	6

London—Merchants' buying prices delivered yard.

	£	s.	d.
Copper (clean)	65	0	0
Brass	42	0	0
Lead (less usual draft)	16	10	0
Tea lead	12	10	0
Zinc	11	0	0
New aluminium cuttings	64	0	0
Braziery copper	64	0	0
Gunmetal	54	0	0
Hollow pewter	120	0	0
Shaped black pewter	87	0	0

PIG-IRON.

(f.o.t. unless otherwise stated.)

N.E. Coast—
Foundry No. 1 70/-
Foundry No. 3 67/6
Foundry No. 4 66/6
Forge No. 4 66/-
Hematite No. 1 75/6
Hematite M/Nos. 75/-

N.W. Coast—
Hem. M/Nos. d/d Glas. 85/6
„ d/d Birm. 93/6

Midlands—
Staffs. common* —
„ No. 4 forge* 74/6
„ No. 3 fdry.* 78/6
Shrops. basic —
„ Cold blast, ord. —
„ „ roll iron —
Northants forge* 71/-
„ fdry. No. 3* 75/-
Derbyshire forge* 74/6
„ fdry. No. 3* 78/6
„ basic* —
*d/d Black Country dist.

Scotland—
Foundry No. 1 80/6
„ No. 3 78/-
Hem. M/Nos. 81/-

Sheffield (d/d district)—
Derby forge 68/6
„ fdry. No. 3 72/6
Lincs. forge. 71/-
„ fdry No. 3 75/-
E.C. hematite 89/-
W.C. hematite 90/-

Lincs. (at furnaces)—
Forge No. 4 —
Foundry No. 3 —
Basic —

Lancashire (d/d eq. Man.)—
Derby forge 73/-
„ fdry. No. 3 77/-
Staffs foundry No. 3 77/-
Dalzell, No. 3 (special) 105/- to 107/6
Summerlee, No. 3 95/-
Glengarnock, No. 3 —
Gartsherrie, No. 3 95/-
Monkland, No. 3 95/-
Shotts, No. 3 95/-

FINISHED IRON AND STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£	s.	d.		£	s.	d.
Bars (cr.)					10	15	0
Nut and bolt iron	9	0	0	to 9	7	6	
Hoops					10	15	0
Marked bars (Staffs) f.o.t.					12	10	0
Gas strip					10	15	0
Bolts and nuts, ⅜ in. × 4 in.					15	5	0
Steel—							
Ship plates	8	15	0	to 8	17	6	
Boiler plts.	9	17	6	to 10	10	0	
Chequer plts.					10	12	6
Angles					8	7	6
Tees					9	7	6
Joists					8	10	0
Rounds and squares, 3 in. to 5½ in.					9	7	6
Rounds under 3 in. to ⅜ in. (Untested)					8	2	6
							and upwards
Flats—8 in. wide and over					8	12	6
„ under 8 in. and over 5 in.					8	17	6
Rails, heavy					8	10	0
Fishplates					12	0	0
Hoops (Staffs)	9	5	0	to 9	15	0	
Black sheets, 24 g.					9	15	0
Galv.cor.shts., 24g.	11	17	6	to 12	0	0	
Galv. fencing wire, 8g. plain					12	0	0
Billets, soft	6	0	0	to 6	10	0	
Billets, hard	7	10	0	to 8	0	0	
Sheet bars	5	15	0	to 6	5	0	
Tin bars	5	15	0	to 6	5	0	

PHOSPHOR BRONZE.

Per lb. basis.

Strip 1/3½
Sheet to 10 w.g. 1/4½
Wire 1/6
Rods 1/5
Tubes 1/9½
Castings 1/4
Delivery 3 cwt. free.
10% phos. cop. £40 above B.S.
15% phos. cop. £50 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. Clifford & Son, Limited.

NICKEL SILVER, &c.

per lb.

Ingots for raising 10d. to 1/4
Rolled—
To 9 in. wide 1/4 to 1/10
To 12 in. wide 1/4½ to 1/10½
To 15 in. wide 1/4½ to 1/10½
To 18 in. wide 1/5 to 1/11
To 21 in. wide 1/5½ to 1/11½
To 25 in. wide 1/6 to 2/-
Ingots for spoons and forks 10d. to 1/6½
Ingots rolled to spoon size 1/1 to 1/9½
Wire round—
3/0 to 10 G. 1/7½ to 2/2½
with extras according to gauge.

AMERICAN IRON AND STEEL.

At Pittsburgh unless otherwise stated.

	Dols.
No. 2 foundry, Phila.	20.26
No. 2 foundry, Valley	18.50
No. 2 foundry, Birm.	14.00
Basic	20.26
Bessemer	20.76
Malleable	20.76
Grey forge	19.76
Ferro-mang. 80%	94.00
O.-h. rails, h'y, at mill	43.00
Billets	33.00
Sheet bars	33.00
Wire rods	38.00
	Cents.
Iron bars, Phila.	2.12
Steel bars	1.80
Tank plates	1.80
Beams, etc.	1.80
Skelp, grooved steel	1.85
Skelp, sheared steel	1.85
Steel hoops	2.20
Sheets, black, No. 24	2.55
Sheets, galv., No. 24	3.30
Sheets, blue an'l'd, No. 13	2.25
Wire nails	2.20
Plain wire	2.40
Barbed wire, galv.	2.95
Tinplates, 100-lb. box	$5.25

COKE (at ovens).

Welsh foundry 27/6 to 30/-
„ furnace 17/6 to 22/6
Durham and Northumberland—
„ foundry 15/6
„ furnace 16/6
Midlands, foundry —
„ furnace —

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. cokes	20×14 box	18/4½
„	28×20 „	36/8
„	20×10 „	26/4½
„	18¾×14 „	19/1½
C.W.	20×14 „	16 6
„	28×20 „	33 9
„	20×10 „	23/6
„	18¾×14 „	17/-
Terneplates	28×20	32/6 per box basis f.o.b.

SWEDISH CHARCOAL IRON & STEEL.

Pig-Iron £6 0 0 to £7 10 0
Bars, hammered, basis £17 10 0 to £18 10 0
Bars and nail-rods, rolled, basis £15 17 6 to £16 15 0
Blooms £10 0 0 to £12 0 0
Keg steel £32 0 0 to £33 0 0
Faggot steel £20 0 0 to £24 0 0
Bars and rods dead soft, steel £11 0 0 to £14 0 0
All per English ton, f.o.b. Gothenburg.

TUBES AND FITTINGS.

Over ½ in. up to 6 in.

	Tubes.	*Fittings.*
Gas	65%	47½%
Water ..	61¼%	42½%
Steam ..	57½%	37½%

W.I. 10% extra.

DAILY FLUCTUATIONS.

Standard Copper (cash).

		£	s.	d.	
April 10 ..	68	5	0	inc.	5/-
,, 11 ..	67	10	0	dec.	15/-
,, 14 ..	67	5	0	,,	5/-
,, 15 ..	63	12	6	,,	72/6
,, 16 ..	58	15	0	,,	97/6

Electrolytic Copper.

		£	s.	d.		
April	10 ..	83	5	0	dec.	5/-
,,	11 ..	82	10	0	,,	15/-
,,	14 ..	82	10	0	No change	
,,	15 ..	81	0	0	dec.	30/-
,,	16 ..	65	0	0	,,	320/-

Standard Tin (cash).

		£	s.	d.		
April	10 ..	166	0	0	dec.	15/-
,,	11 ..	167	7	6	inc.	27/6
,,	14 ..	165	10	0	dec.	37/6
,,	15 ..	164	10	0	,,	20/-
,,	16 ..	164	7	6	,,	2/6

Tin (English ingots).

		£	s.	d.		
April	10 ..	167	5	0	inc.	10/-
,,	11 ..	168	10	0	,,	25/-
,,	14 ..	166	15	0	dec.	35/-
,,	15 ..	165	10	0	,,	25/-
,,	16 ..	165	10	0	No change	

Zinc Sheets (English).

		£	s.	d.		
April	10 ..	28	0	0	No change	
,,	11 ..	28	0	0	,,	,,
,,	14 ..	28	0	0	,,	,,
,,	15 ..	28	0	0	,,	,,
,,	16 ..	28	0	0	,,	,,

Spelter (ordinary).

		£	s.	d.		
April	10 ..	18	0	0	dec.	3/-
,,	11 ..	18	3	9	inc.	3/9
,,	14 ..	18	2	6	dec.	1/3
,,	15 ..	18	1	3	,,	1/3
,,	16 ..	17	18	9	,,	2 6

Lead (English).

		£	s.	d.		
April	10 ..	20	0	0	inc.	5/-
,,	11 ..	20	0	0	No change	
,,	14 ..	20	0	0	,,	,,
,,	15 ..	20	0	0	,,	,,
,,	16 ..	20	0	0	,,	,,

Exports of Iron Castings in March and the three months 1930, compared with March and the three months 1929.

	March, 1929.	March, 1930.	Three months, 1929.	Three months, 1930.	March, 1929.	March, 1930.	Three months, 1929.	Three months, 1930.
	Tons.	Tons.	Tons.	Tons.	£	£	£	£
BUILDERS' CASTINGS—								
Stoves, grates, etc., cisterns, baths, etc., and cooking and washing boilers—								
To Argentine Republic	194	263	603	658	8,471	12,286	29,675	26,083
,, British South Africa	348	145	956	646	11,876	6,357	33,551	25,617
,, ,, India	159	136	505	478	5,730	4,920	18,702	16,979
,, Australia	24	41	224	158	1,784	2,528	12,713	9,822
,, New Zealand	146	87	409	316	6,303	5,132	33,849	18,707
,, Other Countries	892	748	2,699	2,594	38,913	36,886	118,806	117,221
Total	1,763	1,420	5,396	4,850	73,077	68,109	247,296	214,429
PIPES AND FITTINGS—CAST—								
To Argentine Republic	6,760	1,429	11,404	3,672	61,216	13,855	110,790	35,719
,, British South Africa	290	594	1,319	3,116	5,058	7,315	19,813	32,778
,, ,, India	232	177	1,140	1,167	3,287	3,189	17,953	17,914
,, Straits Settlements and Malay States	1,648	191	7,240	1,693	11,715	2,575	52,030	16,599
,, Ceylon	37	25	231	235	513	456	2,521	2,904
,, Australia	557	113	1,500	372	5,672	2,027	15,195	6,361
,, Other Countries	4,054	7,390	13,264	22,356	47,735	83,944	152,790	245,149
Total	13,614	9,919	36,098	32,611	135,196	113,361	371,092	357,424
HOLLOW-WARE—								
Cast, not Enamelled, and Cast, Tinned	375	376	1,164	1,227	12,804	11,581	41,432	38,612
,, Enamelled	77	52	208	194	6,533	5,146	17,913	16,822
CASTINGS, in the rough—								
Iron	60	355	205	946	3,527	6,207	9,788	23,414
Steel	85	197	201	704	4,668	8,083	10,280	25,220

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